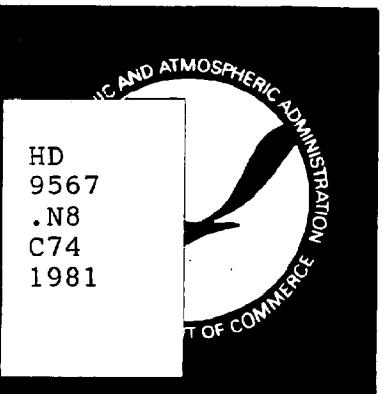
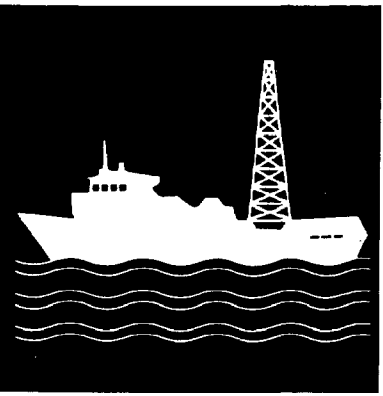
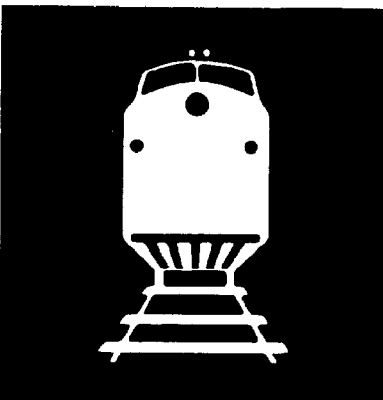


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North Carolina



## Coastal Energy Transportation Study Phase II, Volume I

### A Study of OCS Onshore Support Bases and Coal Export Terminals

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# Coastal Energy Transportation Study Phase II, Volume 1

## A Study of OCS Onshore Support Bases and Coal Export Terminals

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The preparation of this report was financed through a Coastal Energy Impact Program grant provided by the North Carolina Coastal Management Program, through funds provided by the Coastal Zone Management Act of 1972, as amended, which is administered by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration. This CEIP grant was part of NOAA grant NA-80-AA-D-CZ149.

Project No. 80-07  
Contract No. C-6041

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## PREFACE

This report summarizes work on the second phase of a three-phase study funded by the Coastal Energy Impact Program and conducted by the UNC Institute for Transportation Research and Education. Phase I of this study, conducted in 1980, identified and documented the transportation needs necessary to support a group of energy projects proposed for the coastal area of North Carolina.

Following a series of interviews with industry representatives, key officials in coastal counties, and various State agencies in mid-1980, major facilities were identified, energy use scenarios were developed, and transportation needs were assessed. Concurrent with these tasks, an impact assessment methodology was developed for conducting certain Phase II tasks.

The results of Phase I were documented in three reports:

1. A technical report entitled "Coastal Energy Transportation Study: An Analysis of Transportation Needs to Support Major Energy Projects in North Carolina's Coastal Zone," Phase I Report, December 1980 (180 pages);
2. A summary report entitled "Coastal Energy Transportation Study: An Analysis of Transportation Needs to Support Major Energy Projects in North Carolina's Coastal Zone," March 1981 (30 pages); and
3. An executive summary report issued by the Office of Coastal Management entitled "Special Report: First Inventory of Coastal Energy Facilities Reported," April 1981 (2 pages).

All of these reports are available from The UNC Institute for Transportation Research and Education or the Office of Coastal Management in the North Carolina Department of Natural Resources and Community Development.

Phase II (September 1980-August 1981) is divided into two distinct parts:

1. An assessment of impacts of the Outer Continental Shelf (OCS) oil and gas exploration and production activity with emphasis on the transportation requirements and alternative locations for on-shore support base(s) in North Carolina, and
2. An assessment of impacts of coal exports from North Carolina with emphasis on the transportation requirements of alternative locations and capacities of coal terminals.

Phase III (September 1981-August 1982) is an assessment of impacts of transport and storage of all other energy feedstocks and products, including crude oil, refinery products, liquified petroleum gas, peat, wood, and biomass material. A more detailed analysis of coal transportation to North Carolina's ports will also be undertaken during Phase III. Other energy-related projects may be added at a later date.

This report is one of three volumes documenting the results of Phase II as described above. These three volumes are entitled:

1. Coastal Energy Transportation Study: Volume 1, A Study of OCS Onshore Support Bases and Coal Export Terminals;
2. Coastal Energy Transportation Study: Volume 2, An Assessment of Potential Impacts of Energy-Related Transportation Developments on North Carolina's Coastal Zone; and
3. Coastal Energy Transportation Study: Volume 3, An Analysis of State and Federal Policies Affecting Major Energy Projects in North Carolina's Coastal Zone.

Scheduling of tasks was designed to permit the study team to complete key activities in advance of certain critical dates. For example, many of the tasks related to OCS activity in Phase II have been completed so that state, regional, and local decisionmakers involved in the OCS program will have output prior to August 1981, the scheduled date for OCS Lease Sale #56 by the Bureau of Land Management.

The movement of export coal shipments through North Carolina is now underway. The contract with Alla-Ohio Coal Company to ship three million tons annually through the State Ports Authority (SPA) facilities in Morehead City was announced in October 1980; and the first shipment of export steam coal left Morehead City for Holland on May 13, 1981. Although the situation regarding the development of energy projects is constantly changing, this report is based on the most up-to-date information available at the time of printing.

An additional, parallel task of this study has been the monitoring of the situation regarding all types of energy projects in the coastal zone. The dynamics of the other projects that will be included in Phase III, as well as those of the coal exports and OCS lease sale, are of interest.

Since this research project began in January 1980, a significant amount of activity has taken place in the North Carolina coastal zone with respect to proposals for new or expanded energy projects. These project proposals have been in response to changing economic conditions and dynamic corporate and private investment strategies. For example, since the Phase I report

was written, the following captions from Raleigh and Wilmington newspapers reveal the "shifting attitudes" surrounding the development of the Brunswick Energy Company (BECO) refinery in Brunswick County, across the Cape Fear from Wilmington:

11/18/80 "Building Refinery"  
1/04/81 "Refinery, Smelter Debated"  
1/28/81 "U.S. Agency Not Taking Stand on Refinery"  
2/22/81 "BECO, Environmentalists at Odds"  
3/08/81 "Low Demand (for petroleum products) Closing  
Refineries"  
4/28/81 "BECO to 'Re-evaluate' Brunswick Co. Refinery"  
4/29/81 "BECO May Consider Selling Refinery Project"  
5/15/81 "BECO Drops Plans to Build Oil Refinery"

Continued monitoring of the local, state, national, and international situations that affect the potential of energy developments in North Carolina will be continued throughout this study.

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## ACKNOWLEDGMENTS

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## ABSTRACT

Following an earlier study (Phase I) that focused on the identification and documentation of transportation facilities necessary to support major energy projects proposed for the coastal area of North Carolina, this study concentrates on two of the projects (1) on-shore support bases for Outer Continental Shelf (OCS) oil and gas exploration and (2) coal export terminals.

In order to develop location alternatives for OCS support bases, shore support requirements are identified, 16 alternative sites are described, and a parametric analysis is utilized to select the most promising sites. Site-specific recommendations regarding infrastructure requirements and transportation impacts are provided.

In the case of coal exports, it is anticipated that overseas demand for steam coal, which exploded in 1980, will continue to grow during the decade. But congestion at major coal ports along the eastern seaboard--Hampton Roads, Baltimore, and Philadelphia--is not expected to be alleviated for several years. Recent estimates of delays to colliers desiring to load at Hampton Roads indicate that as many as 150 vessels are anchored and experiencing waiting periods of 50 to 60 days each. These delays and the resulting demurrage charges which average \$15,000 per day per ship are an understandable source of concern to the industry.

In response to these problems, nearly two dozen U.S. ports have announced plans for new coal export facilities. This study explores plans for coal port expansion on the east coast, attempts to determine needed capacity, identifies major bottlenecks including vessel size and channel depths, and seeks location alternatives for export terminals. It is evident that coal shippers are not only expanding existing export facilities in traditional eastern coal ports, but also turning to ports that have exported little or no coal in the past. Projected annual throughput of coal exports from North Carolina's deepwater ports during the next decade are projected to be between 54 and 67 million tons by 1990. This report identifies eleven alternative terminal sites and assesses their potential impacts on the Coastal Study Area.

## SUMMARY AND CONCLUSIONS

Volume 1, A Study of OCS Onshore Support Bases and Coal Export Terminals, addresses two major projects:

1. Impacts of Outer Continental Shelf (OCS) oil and gas exploration activity; and
2. Impacts of coal export movement from North Carolina.

Following an assessment of industry needs for each of these projects, transportation requirements and location alternatives for OCS on-shore support bases and coal export terminals were determined as follows.

### Location Alternatives for OCS Support Bases

Sixteen prospective site locations for an OCS support base were identified and briefly described. Following field inspection, each of these sites (see Table 5) was reviewed to ascertain its compliance with a checklist of industry needs. Specific port and marine infrastructure requirements needed to establish temporary OCS service bases along the North Carolina coast were used as guidelines in this process. It should be noted that four of the 16 sites under consideration (C-5, C-8, C-13, and C-17) are also evaluated in Chapter 3 as potential coal terminal locations.

Sixteen measures of merit were used in an updated parametric analysis of the support base sites. A preliminary analysis was presented in Table 3-4 of the Phase I report, but that analysis has been modified with respect to sites and merit measures to reflect the most current information available as of April 1981.

If all of the merit measures were equally weighted, a simple summation would reveal the best of the candidate sites. But this is obviously not the case, and engineering judgment is needed to narrow the list of candidates. Two outstanding sites were identified: Sites 17 and 23 (see Table 7). Because of their location in an existing SPA terminal at Wilmington and Morehead City, respectively, each is in the enviable position of having most of the necessary port and marine service infrastructure requirements already provided. Having relatively little demand for capital expenditures and the ability to begin operation almost immediately will make each of these sites especially attractive to the oil and gas drilling companies. Each has at least 1,000 feet of wharf and 35 feet of channel depth available at the site. Each is in a port area previously zoned for industrial use; good rail and highway facilities are available; and storage areas, cranes, fresh water, and bunkering facilities are already provided. With the possible exception of Site 22, which has been earmarked as a bulk phosphate facility for the North Carolina Phosphate Company, all other sites would require substantial investments of time and capital to acquire the necessary infrastructure.

Although there is little to choose between the two sites, it is recommended that Site 23 be given top priority as a support base site because of its proximity to the Northern Tract Group in Lease Area No. 56. Both its air and water distances to the lease area are approximately half of those for Site 17, and Site 23 is much closer to the open ocean. It is further recommended that, if exploratory drilling for OCS oil and gas is undertaken in 1981 or soon thereafter, the State of North Carolina through its appropriate agencies should take the steps necessary to make five to ten acres of land at Site 23 on the SPA terminal property in Morehead City available for use as a temporary onshore support base site. If a second support base is needed, steps should be taken to make a similar amount of land available on the SPA terminal in Wilmington at or near Site 17.

#### Location Alternatives for Coal Export Terminals

Utilizing U.S. coal production and export projections from a series of recent national studies, estimates of East Coast coal terminal capacity were prepared. Export potential for the South Atlantic range of ports, with particular emphasis on North Carolina's two deepwater ports, was then explored.

Firm commitments or announced plans to locate coal terminals in the State have been reported in the news media for five locations. If all of these plans materialize and if the announced tonnages are realistic, as much as 54 to 67 million tons of coal could be exported from North Carolina by the end of the decade.

Finally, eleven prospective sites in the Coastal Study Area were described and analyzed to ascertain their suitability as future locations for coal export terminals. Specific recommendations for sites in Morehead City, along the Cape Fear River, and offshore were itemized. It is anticipated that, during Phase III of this study, alternative transportation modes or systems that could relieve anticipated bottlenecks in the coal-haul railroad network or other transportation networks will be investigated.

Analysis of the coal sites was complicated by the fact that several of the sites, regardless of whether or not they are the best sites, have already been selected by coal companies as export terminal sites. As a result, Sites C-12 and C-16 in Morehead City and C-7 and C-20 in Wilmington have been pre-empted for coal terminals in the past six months. In fact, most of the better sites have either been purchased or are presently under option.

With these constraints in evidence and considering the findings revealed in this chapter, the following tentative recommendations are proposed:

#### Morehead City Sites

1. That because the planned throughput of the Alla-Ohio Valley (C-16) and Gulf Interstate (C-12) terminals will far exceed the practical capacity of the railroad line through Morehead City, future expansion of these terminals should be very carefully evaluated.



2. That no additional coal terminals be approved in the Morehead harbor until major changes are implemented in the land transportation link for coal inbound to the port. These changes could include a rail bypass, slurry pipeline, conveyor system, barge service, or some combination of systems.

#### Cape Fear River Sites

3. That, other than a moderate-sized terminal on SPA property (Site C-17), no additional coal terminals should be sited on the east side of the Cape Fear River because of railroad grade crossing problems in Wilmington.
4. That, if additional throughput capacity is required along the Cape Fear River, Site C-5 (north of Pfizer Chemical Company) and Site C-8 (north of Town Creek) should be considered as the best of the remaining available sites.

#### Offshore Sites

5. That, if any coal companies desire to develop an offshore export terminal complex to load coal in deep water (>60 feet), Site C-18 (Hampstead/Scotts Hill) and possibly Site C-14 (near U.S. 70 and N.C. 24 west of Morehead City) should be initially considered.

## 1.0 INDUSTRY NEEDS

Seemingly endless increases in the price of imported crude oil coupled with recent political upheaval in the Middle East have underscored this nation's vulnerability in continuing to depend on foreign sources for a large part of our energy supply. The need to increase our domestic resource production and reduce our consumption of scarce fuels is well documented. Recent administrations have stressed the need for greater energy independence. The goal of reducing our oil imports in 1990 to one-half the current level has been suggested.

One of the most desirable ways to attain this goal is to encourage domestic production of oil and gas--both onshore and offshore. On the demand side, the need for imported oil can be substantially reduced by converting oil-fired electric generating plants to coal-fired plants. Each of these means of attaining greater self sufficiency will impact different areas of the country in varying degrees. In the Southeast, the most promising location for increased domestic oil and gas production is the Proposed 1981 Outer Continental Shelf (OCS) Oil and Gas Lease Sale No. 56, where the U. S. Geological Survey (USGS) has estimated there are 1.4 billion barrels of oil and 2.5 trillion cubic feet of gas in the leasing area. It is assumed that production, which is expected to peak in 1993, will be gathered from the offshore production areas and transported ashore to landfalls in Georgia and North Carolina.

The export of coal from the U.S. is currently increasing. Steam coal is already beginning to move out of several South Atlantic ports other than Hampton Roads, which has long been the world's leading coal port. Although some of these shipments may be destined for domestic generating plants in New England and Florida, most of the initial demand for export steam coal is originating in Western Europe where conversion from oil to coal in the generation of electricity has taken place much more rapidly than it has in this country.

Just how these two energy developments--OCS oil and gas production and coal exportation--will impact the Coastal Study Area of North Carolina and what specific concerns the State should address to mitigate their impacts, will be described in the following sections.

### 1.1 Outer Continental Shelf Oil and Gas Development and Production

The Final Environmental Impact Statement prepared for proposed Lease Sale 56 by the Bureau of Land Management (BLM) indicates that 286 tracts totalling 1.6 million acres in Federal waters offshore North Carolina, South Carolina, Georgia, and Florida will be offered for sale in August 1981. These tracts, which are located from 16 to 111 nautical miles off the coast in water depths of 65 to 6,890 feet, are depicted in Figure 1. Sale

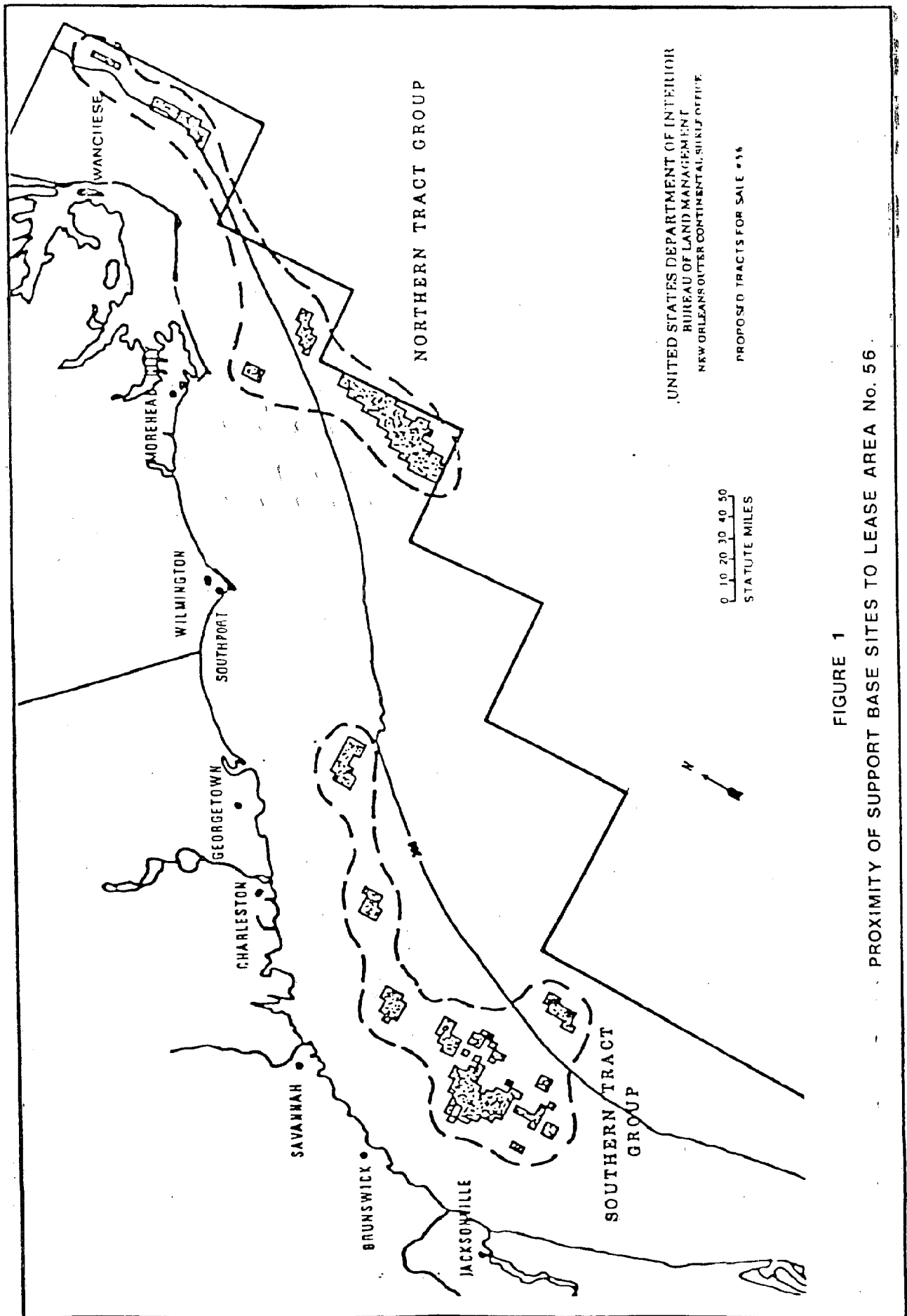


FIGURE 1  
PROXIMITY OF SUPPORT BASE SITES TO LEASE AREA No. 56

tracts are divided into two geographic groups according to their proximity to likely shore-based services. The Northern Tract Group includes 130 tracts off the North Carolina coast while the Southern Tract Group encompasses 156 tracts off the coasts of north Florida, Georgia, and South Carolina. Existing commercial ports in the South Atlantic region are also shown.

Resource and offshore infrastructure estimates for proposed Sale 56, which were furnished to BLM by the Conservation District, Eastern Region, provide an insight into industry requirements. Tables 1 and 2 summarize estimates for resources and offshore infrastructure and provide an estimated timetable for development utilizing low (5% probability), mean, and high (95% probability) recovery estimates. These estimates in turn provide the basis for Northern Tract Group Offshore Development Scenarios (Table 3) which help predict the estimated number of wells and platforms as well as daily production of oil and gas.

Because the Coastal Study Area of North Carolina will most likely be impacted only by exploration activities in the Northern Tract Group, estimates of industry needs in Phase II of this investigation will focus on the 130 tracts in the Northern Tract Group. OCS oil and gas development activities resulting from Lease Sale 56 could eventually produce a multiplicity of impacts on the quality of life in the Study Area. Chapter 2 (Location Alternatives for OCS Support Bases) of this study will be concerned only with the requirements for and impacts created by onshore support facilities required during the exploratory drilling period. Support facility requirements for the development drilling period will be addressed during Phase III of the study.

## 1.2 Coal Export

Overseas demand for steam coal, which exploded last year, is expected to continue to grow during 1981; but congestion at major coal ports along the eastern seaboard--Hampton Roads, Baltimore, and Philadelphia--is not expected to be alleviated for the next year or two. Recent estimates of delays to colliers desiring to load steam coal at Hampton Roads indicate that up to 150 vessels are anchored and experiencing waiting periods of 50 to 60 days each. Coal buyers are understandably concerned by the lengthy delays and resulting demurrage charges which industry sources indicate have been running at \$18 per ton and higher. Not only are these demurrage charges passed along to buyers, but the congestion has also cost the U.S. coal industry about 8 to 10 million tons of lost sales over the past year.<sup>1</sup>

There appears to be little doubt that the demand for export coal will increase drastically during the coming decade. According to a recent study published by a federal government coal export study group, port authorities, railroads, and coal products will provide the impetus for an order of magnitude increase in U.S. coal exports in the next five years. The Interagency Coal Export Task Force projects that U.S. coal export terminal capacity could expand from the congested 94.4 million ton level of 1980 to as much

---

<sup>1</sup>"Strong Demand for Steam Coal Expected Abroad," The Journal of Commerce, February 17, 1981.

**TABLE 1. ESTIMATED RESOURCES AND OFFSHORE INFRASTRUCTURE**

	Low(5%)	Mean	High(95%)
<b>A. Resources</b>			
1. Total Production			
a. Oil (billion barrels)	0.8	1.4	2.1
b. Gas (trillion cubic feet)	1.4	2.5	3.5
2. Daily Peak Production			
a. Oil (barrels)	216,700	326,800	490,100
b. Gas (million cubic feet)	384.9	617	841
<b>B. Offshore Infrastructure</b>			
1. Wells Drilled			
a. Exploratory/Delineation	101	101	101
b. Development	360	1,299	1,299
2. Platforms Installed	13	56	56
3. Pipelines Constructed (miles) <sup>a</sup>	140	340	540

Sources: USGS, 1979 and BLM, 1980.

<sup>a</sup>BLM estimate.

**TABLE 2. ESTIMATED RECOVERY RATE FOR OFFSHORE INFRASTRUCTURE  
DEVELOPMENT TIMETABLE**

Year	Wells Drilled						Pipelines Constructed (miles) <sup>b</sup>					
	Exploration <sup>a</sup>			Development <sup>b</sup>			Platforms Installed					
	Low	Medium	High	Low	Medium	High	Low	Medium	High	Low	Medium	High
1982	15	15	15									
1983	15	15	15									
1984	15	15	15									
1985	15	15	15									
1986	15	15	15									
1987	15	15	15									
1988				21	96	96	3	12	12	40	60	90
1989				63	280	280	3	11	11	30	60	90
1990				84	264	264	3	11	11	20	60	90
1991				77	264	264	2	11	11	20	60	90
1992				62	264	264	2	11	11	20	60	90
1993				42	131	131				10	40	90
1994				12	0	0						
TOTAL	101	101	101	360	1299	1299	13	56	56	140	340	540

Sources: USGA, 1979 and BLM, 1980.

<sup>a</sup>Delineation wells are included with exploratory wells in this and all subsequent tables.

<sup>b</sup>BLM estimate by year.

**TABLE 3. ESTIMATED RECOVERY RATE FOR NORTHERN TRACT GROUP  
OFFSHORE DEVELOPMENT SCENARIOS**

Northern Tract Group Scenarios										
Year	Wells Drilled				Platforms Installed		Daily Production			
	Exploratory		Development				Oil (MBOPD)		Gas (MMCFP)	
	Low	High	Low	High	Low	High	Low	High	Low	High
1982										
1983	4	4								
1985	9	9								
1986	12	12								
1987	12	12								
1988	9	9								
1989			0	16	0	2	0	6	0	10
1990			14	80	2	6	8	36	15	62
1991			42	160	2	8	34	96	60	165
1992			56	200	2	9	67	171	120	295
1993			42	124			92	218	165	378
1994			12	0			100	198	178	339
1995							90	179	160	307
2000							48	108	87	186
2005							30	66	53	113
TOTAL	46	46	166	580	6	25				

Source: BLM, 1980.

as 277.8 million tons annually by 1985.<sup>2</sup> This projection is based on terminal expansion of 23 million tons already underway plus commitments for another 160.4 million tons. Even the most conservative estimates indicate a doubling of coal export capacity to 200 million tons by 1985 accompanied by a reduction in port congestion by that time.

Nearly two dozen ports have announced plans for new coal export facilities.<sup>3</sup> On the East Coast, expansion is underway not only at Norfolk, Newport News, and Baltimore--currently the most active coal ports--but also at Camden, New Jersey; Philadelphia; Morehead City; Wilmington, North Carolina; Charleston; Savannah; and Brunswick, Georgia. In fact, if all the recently announced plans for export terminals materialize, coal could become the region's major export commodity during the 1980's. How the movement of these tonnages of export steam coal through North Carolina and its major ports will impact the Coastal Study Area will be explored in the chapter, "Location Alternatives for Coal Export Terminals."

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<sup>2</sup>Interagency Coal Export Task Force, "Report on Ports and Ocean Transportation." December 1, 1980.

<sup>3</sup>"Shaping Up to Ship Out," Forbes, February 16, 1981.

## 2.0 LOCATION ALTERNATIVES FOR OCS SUPPORT BASES

### 2.1 Shore Support Requirements

Three scenarios for OCS oil and gas development, which were prepared by the Bureau of Land Management in 1980, were identified in Chapter 1. Resources and offshore infrastructure needed for each scenario, as well as development timetables, were also provided. From these estimates, assumptions can be made concerning the onshore facility requirements for proposed Lease Sale No. 56. As previously indicated, the principal concern for the Coastal Study Area is to determine the need for and potential location of onshore support facilities in the form of service bases and/or heliports.

### 2.2 Service Bases

Previous exploration activities in this country, especially in the Gulf of Mexico, suggest that onshore support needs are met by establishing temporary service bases during initial exploration activities and permanent service bases once the oil companies have identified commercial quantities of oil or gas. Temporary service bases are usually established in existing harbors where adequate wharfage, storage, supply, and bunkering facilities are available. Ports that are congested by recreational boating or commercial shipping are generally avoided if more desirable port facilities are available. Permanent service bases normally provide the same support services available at a temporary base, but more storage area is required to handle larger quantities of material associated with a higher level of offshore activity. If existing developed ports are located within 100 to 150 miles of the OCS activity, as they are in North Carolina, temporary bases will most likely be developed.

### 2.3 Siting Considerations

Whether temporary or permanent, most service bases in the United States have been owned and operated by the energy exploration companies. Each company selects its service base sites independently, but there are certain trends in selection that facilitate the identification of optimum sites for development. During the initial stages of exploration, energy companies might logically establish a temporary service base in an existing port if adequate facilities are available and good service can be expected. The companies may prefer to lease or rent such facilities to reduce initial capital expenditures. Whether owned, leased, or rented to the exploration company, state officials have a responsibility to the citizens of North Carolina to see that the selected service base sites are those which promise the optimum combination of economic and social benefits and will have the least impact on the environment and quality of life in the Coastal Study Area.



Because exploration on the South Atlantic coast is not yet underway, it is reasonable to assume that one or more temporary service bases will be required in North Carolina to serve the Northern Tract leases. The following physical characteristics and facilities<sup>4</sup> are usually required for a temporary service base to be located in an existing harbor:

1. Least feasible distance to offshore activity,
2. All weather harbor,
3. Channel depth of 15 to 20 feet,
4. 200 feet of available wharf,
5. 5 to 10 acres of adjacent flat (<2% slope) land,
6. Highway access,
7. Railroad access, and
8. Air access.

From the Northern Tract Group Development Scenarios shown in Table 3 the following estimates of the required number of temporary service bases have been developed by BLM: 1984, 1; 1986, 1-3; 1988, 1-3. (Note: The number of service bases required would be the same for low, mean, and high resource recovery estimates.)

The precise number of bases will be dependent upon such factors as the number and distribution of offshore holdings, the number of companies involved, the schedule of exploration activity, the availability of land and facilities, and the number of companies served from each lease. Thus, it appears that planning for a minimum of one temporary service base by 1984 and perhaps one or two additional bases by 1986 should be initiated.

#### 2.4 Site Specific Needs

A temporary service base should be able to provide the necessary shore support capability, including the transfer of workers, equipment, and supplies, for offshore drilling operations. A typical service base will provide berthage for crewboats and supply vessels, wharf space for transferring supplies, warehouse and open storage areas, and office space. A heliport may also be provided at the support base, but there are strong arguments for establishing helicopter facilities at existing airports where air traffic control equipment already exists and where personnel can be transferred more rapidly from commercial aircraft to the drilling sites.

Drilling companies will often seek service base sites in ports closest to the offshore activity if land can be leased on a short term basis.

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<sup>4</sup>R. F. Weston, Inc. "Methodology for Assessing Onshore Impacts for Outer Continental Shelf Oil and Gas Development," Volume II, 1980.

As a result, ports with easy access to the open ocean, adequate turning basis, and uncongested inner harbors are potentially attractive if they also contain the necessary port and marine service infrastructure. Such infrastructure includes water, utilities, transportation access, and medical, waste disposal, and communication facilities. Specific needs for temporary service bases in North Carolina, which are summarized in Table 4, are a modification of requirements previously identified in the Weston study and the Final Environmental Impact Statement (EIS) for Lease Sale 56.

## 2.5 Optimal Number of Sites

A review of the geography of Lease Area 56 quickly reveals that the Southern Tract Group would best be served by support bases located in Jacksonville, Brunswick, Savannah, or Charleston while the Northern Tract Group most logically would be served by one or more bases in an existing North Carolina port. Tentative site locations in each of the four ports--Morehead City, Wanchese, Southport, and Wilmington--were identified during the early part of this study and were summarized in Table 2-1 of the Phase I Report.<sup>5</sup> Prospective site locations, which have been updated to reflect certain changes in land use since late 1980, are listed in Table 5. Each of the 14 sites was visited by the project staff in July 1980, and again in March 1981 to ascertain its suitability for consideration as a future temporary support base location.

Before an evaluation of alternative sites could be undertaken, it was necessary to attain greater specificity in the site requirements. To this end the checklist of industry needs compiled in Table 6 enabled project personnel to gather and screen data that would subsequently assist them in reaching decisions relative to support base recommendations.

## 2.6 Identification of North Carolina Sites

A brief description of each of the 16 prospective sites, along with its strength and limitations, is provided in the following paragraphs.

2.6.1 Morehead City--As indicated in Figure 2, the four prospective sites in the Morehead City area are located in an industrial area near the existing State Ports Authority terminal. Each is conveniently located with respect to the 40-foot deep turning basin and ship channel and is only 3½ miles from the open ocean. Sites preceded by a "C" designator indicate that the location is being considered both as a coal terminal and as an OCS supply base site.

Site C-13: Marsh Island--Marsh Island, which is located just north of the SPA terminal (extreme right side of Figure 3) is undeveloped and is presently being used as a spoil dumping ground by the U.S. Army Corps of Engineers. Some lightly wooded areas, along with some wetlands on the northern side of the island, make up most of the terrain. The east side

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<sup>5</sup>ITRE staff, "Coastal Energy Transportation Study," Phase I Report, December 1980.

**TABLE 4. PORT AND MARINE SERVICE INFRASTRUCTURE  
REQUIREMENTS FOR TEMPORARY OCS SERVICE BASE**

---

1. Land	5-10 acres of flat land (<2% slope) on an all weather harbor
2. Waterfront	200-400 linear feet of wharf
3. Channel Depth	15-20 feet
4. Fuel	26,000 bbl/rig/year during drilling
5. Fresh Water	5.2 million gallons/rig/year during drilling
6. Solid Wastes	Facilities to handle up to 6 tons per day (including hazardous wastes)
7. Noise	Up to 85 decibels, 24 hours/day
8. Communication	Telephone and radio facilities
9. Medical	Hospital within 10-15 minutes of travel time
10. Highway Access	Minimum two-lane service road that will support truck loads
11. Rail Access	Spur line and storage tracks
12. Air Access	Helipad on base or heliport at nearby airport (less than 30 minutes travel time)

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**TABLE 5. PROSPECTIVE OCS SUPPORT BASE SITES**

<b>Site</b>	<b>Location</b>	<b>Acreage</b>
<b>Morehead City</b>		
C-13	Marsh Island	50
21	Radio Island	10
22	Existing SPA Terminal (NW corner)	10
23	Existing SPA Terminal (west side)	10
<b>Wanchese</b>		
15	Adjacent to harbor	10
<b>Southport</b>		
C-5	North of Pfizer Chemical Co.	350
6	South of Pfizer Chemical Co.	200
<b>Wilmington</b>		
1	Eagle Island	50
2	South of Barnards Creek	50
3	North of Snow's Cut	50-100
4	North of Snow's Cut	50-100
C-8	North of Town Creek	250
9	South of NC 133 on Brunswick R.	220
10	North of W. R. Grace Co. on NE Cape Fear River	70
11	West of General Electric Co. on NE Cape Fear River	50
C-17	North end of existing SPA Terminal	10

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**TABLE 6. CHECKLIST OF INDUSTRY NEEDS OCS SUPPORT BASE SITES**

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**Land**

- Area
- Topography
- Land Use
- Ownership

**Transportation**

- Highway Access
- Rail Access
- Air Access

**Employment**

- Direct
- Indirect

**Water**

- Channel Depth
- Wharf Length
- Access to Open Water
- Proximity to Channel

**Distance to Lease Area**

- Air Distance
- Water Distance

**Permittability****Supplies**

- Water
- Utilities
- Fuel
- Solid Wastes

**Competition for Use**

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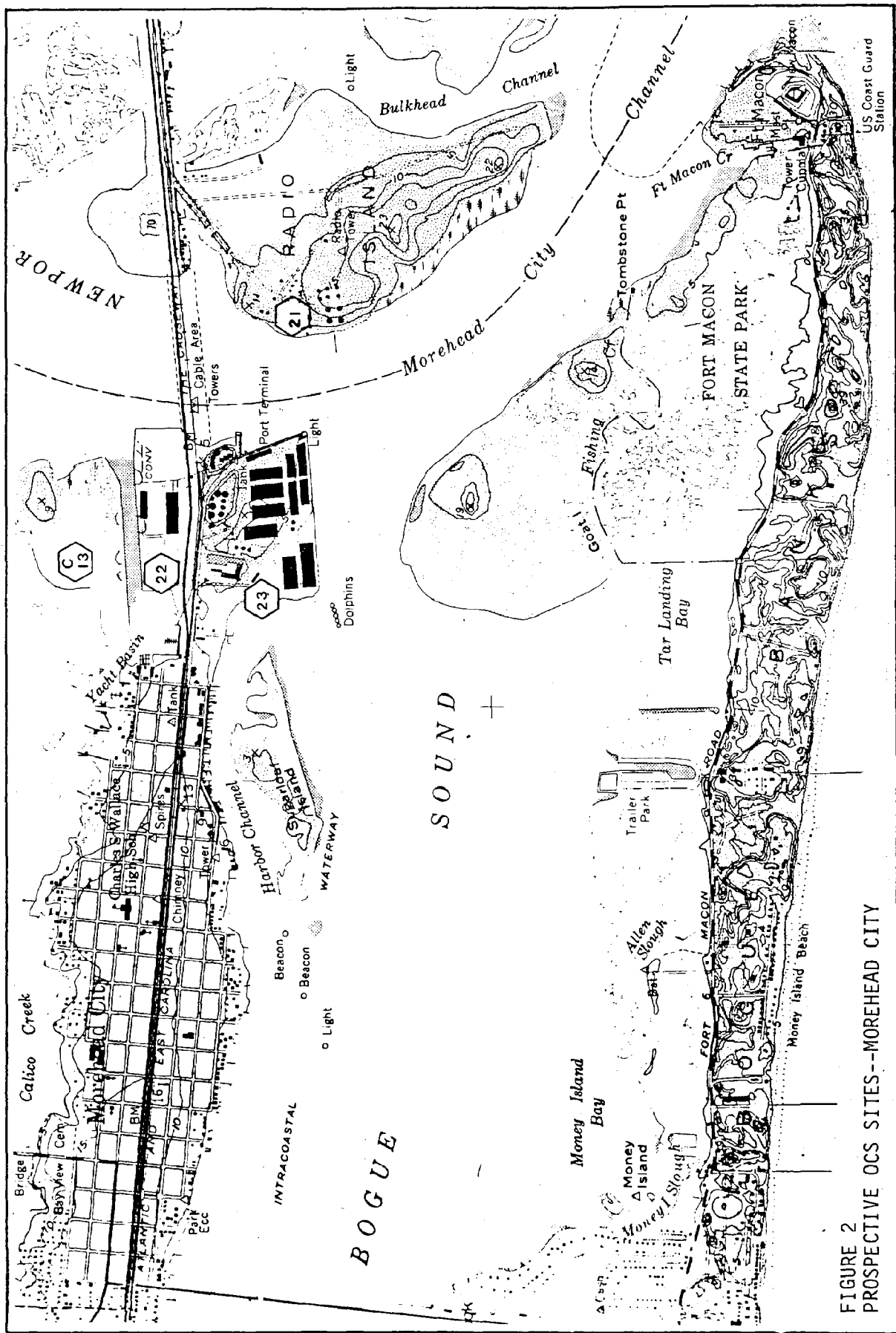


FIGURE 2  
PROSPECTIVE OCS SITES--MOREHEAD CITY

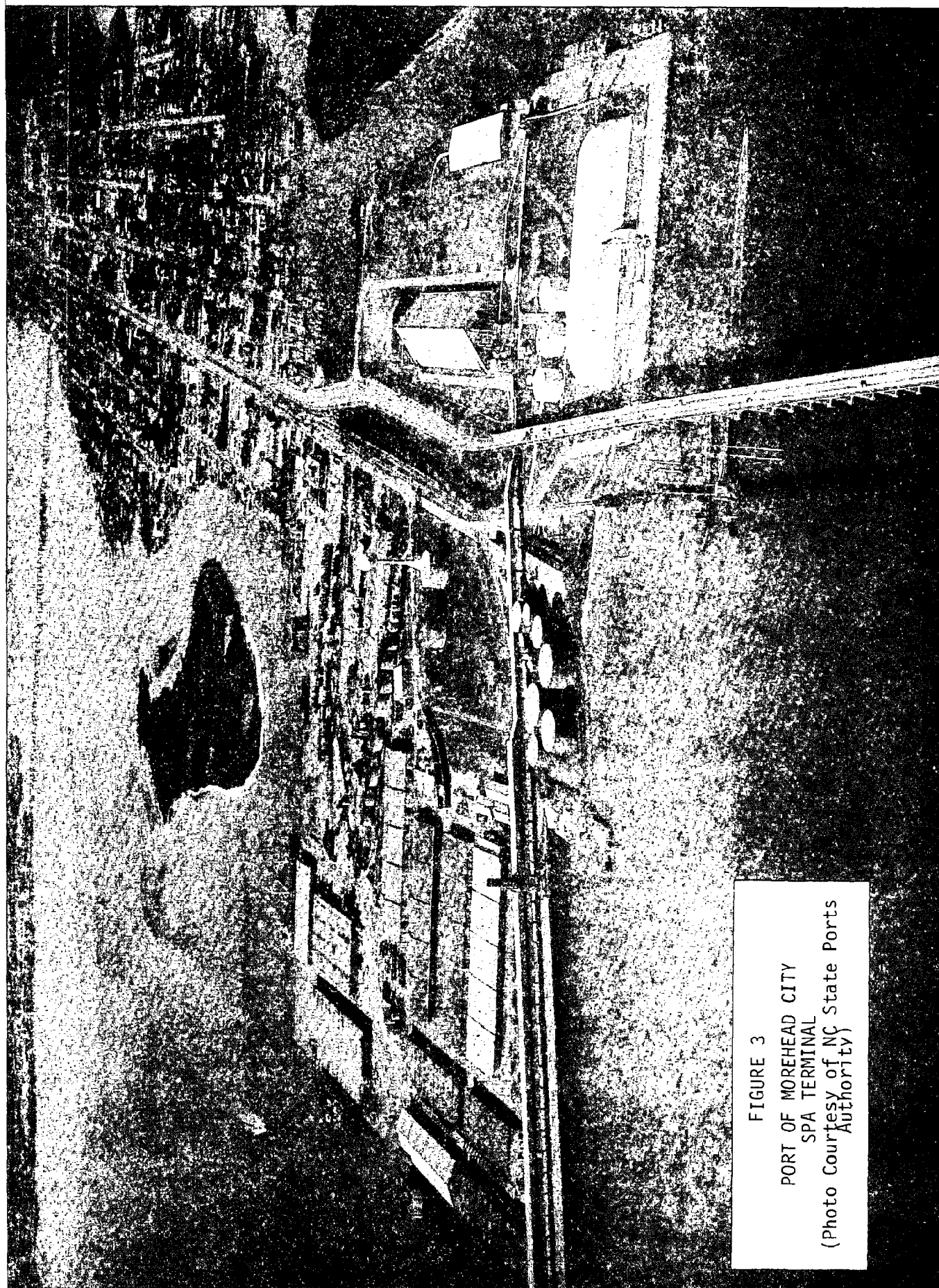


FIGURE 3  
PORT OF MOREHEAD CITY  
SPA TERMINAL  
(Photo Courtesy of NC State Ports  
Authority)

of the island is approximately 500 feet from the 12-foot channel of the Atlantic Intracoastal Waterway. The 40-foot channel does not extend north of the parallel bridges (U.S. 70 and B&MRR). Each of these bridges provides a horizontal clearance of 80 feet for vessel traffic; the fixed highway bridge has a vertical clearance of 65 feet mean high water (MHW) while the bascule railroad bridge has a vertical clearance of 4.0 feet (MHW) when closed. As shown in Figure 2, there is no rail or highway access to Marsh Island.

Site 21: Radio Island--A site encompassing approximately ten acres of land owned by SPA and located on the west side of Radio Island has been identified as a prospective supply base site. As depicted in Figure 4, this site is just north of the aviation fuel terminal on Radio Island and is close to the 40-foot channel. Good highway and rail access are available on Radio Island, but rail traffic may become congested when a planned coal terminal (C-12: Gulf Interstate Company Site) on Radio Island becomes operational.

Site 22: Existing SPA Terminal (northwest corner)--Figure 3 reveals that there is little open land on the west side of the Morehead City channel for expansion of the existing SPA terminal. The open area near the water tower in the center of the terminal has already been committed to Alla-Ohio Valley Coal Company for an export terminal. One remaining parcel of undeveloped land still remains at the northwest corner of the SPA property, just west of the phosphate storage area. The site indicated in Figure 2 is adjacent to a relatively shallow access channel (Calico Creek) which serves a yacht basin and barges discharging phosphate from the Texasgulf Company facility on the Pamlico River. Because it is north of the bridges previously described, Site 22 would have the same access problems inherent in Site C-13, e.g., limited channel depths and bridge clearances.

Site 23: Existing SPA Terminal (west side)--Just south of U.S. 70 and along the west side of the present State Ports Authority terminal is another prospective support base location--Site 23. This site is the only one identified so far that already meets most of the port and marine service infrastructure requirements listed in Table 4. It has over 1,000 lineal feet of wharf with a 35-foot channel alongside, good rail and highway facilities into the site, paved storage areas and nearby warehouses, and access to utilities and communications. Most importantly, it is ready for almost immediate occupancy without major capital expenditures and presumably would face less stringent permitting requirements because of the industrial nature of present port activity at the terminal.

#### 2.6.2 Wanchese

Site 15: Adjacent to Wanchese Boat Harbor--The general location of a prospective OCS supply base site adjacent to the Wanchese boat harbor on Roanoke Island is illustrated in Figure 5. Site 15 is a 10-acre parcel of land on the north side of the harbor between Broad Creek and the boat harbor. Because of the relatively isolated location on Roanoke Island, the site would have no rail access and somewhat limited highway and air access.



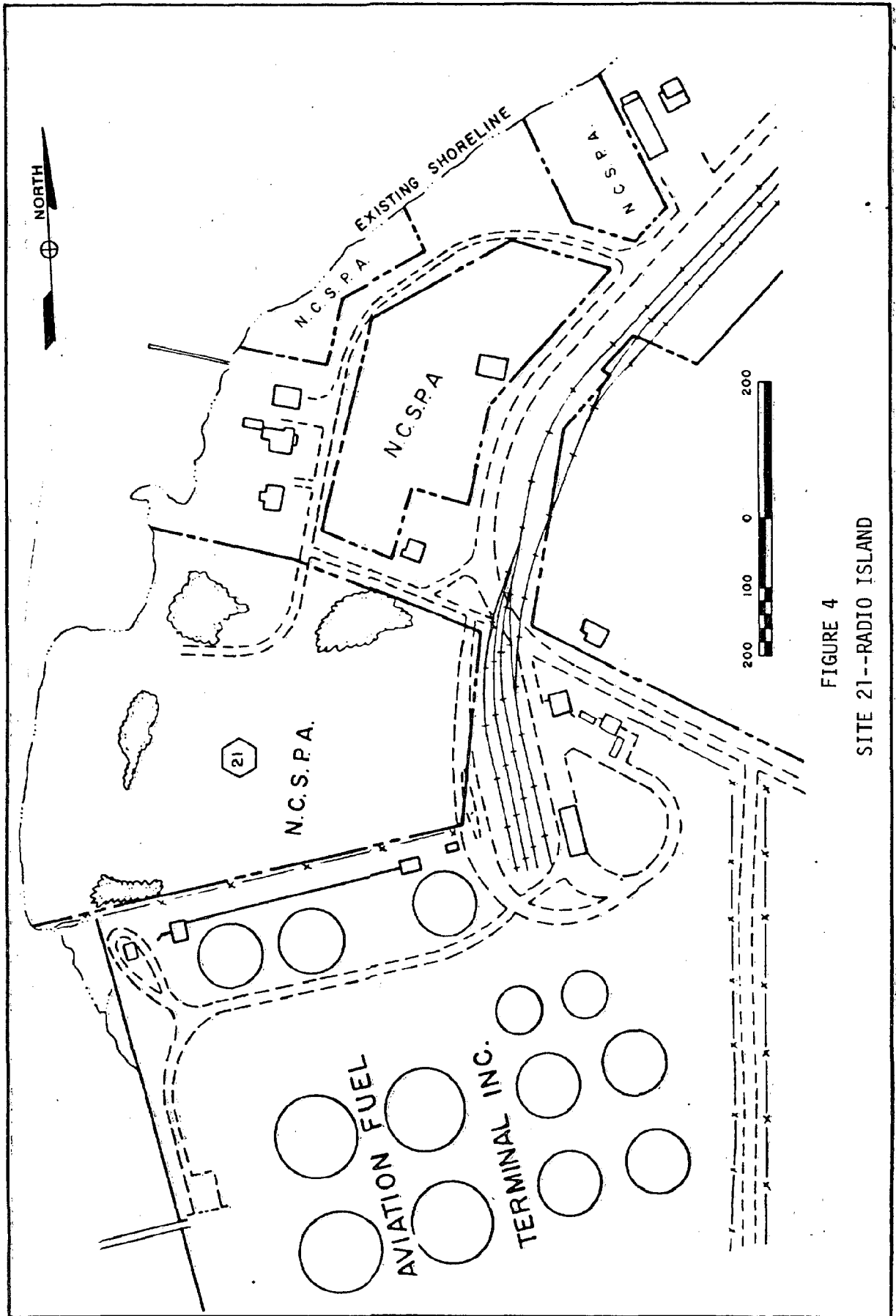
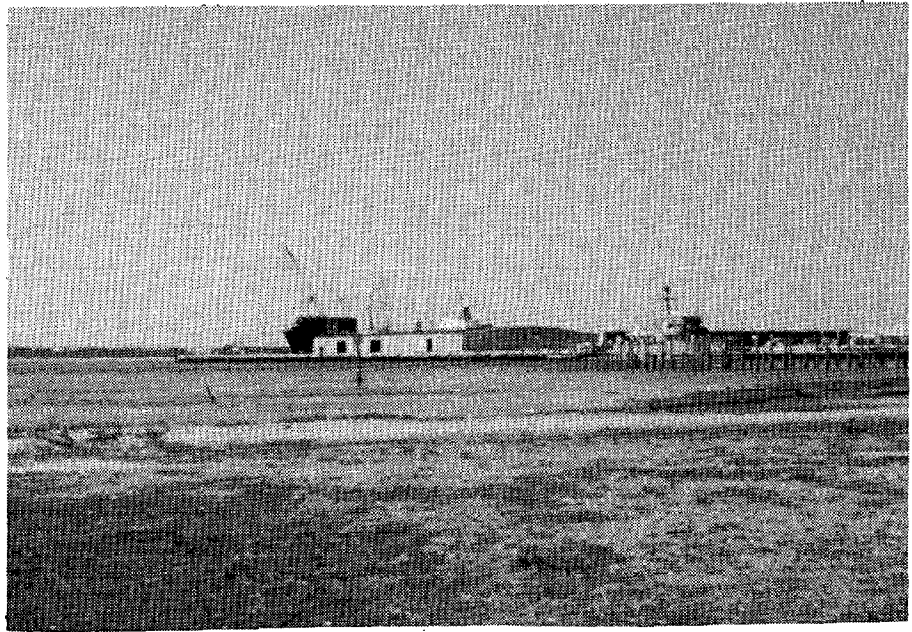
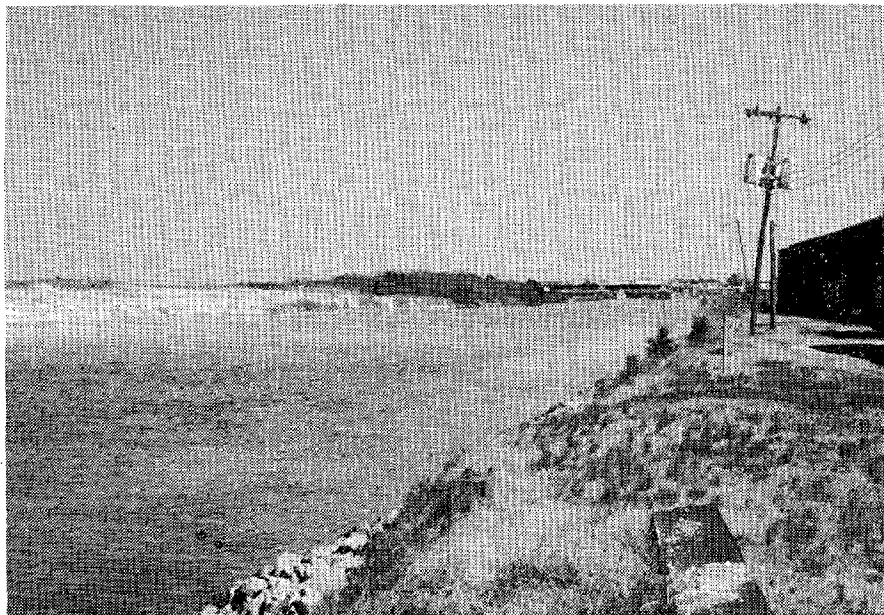


FIGURE 4  
SITE 21--RADIO ISLAND



Most of the prospective OCS support base sites in the Morehead City area are clustered around the State Ports Authority Terminal. Site 23 (above) along the west side of the terminal and Sites 22 and C-13 (below) along Calico Creek are shown.



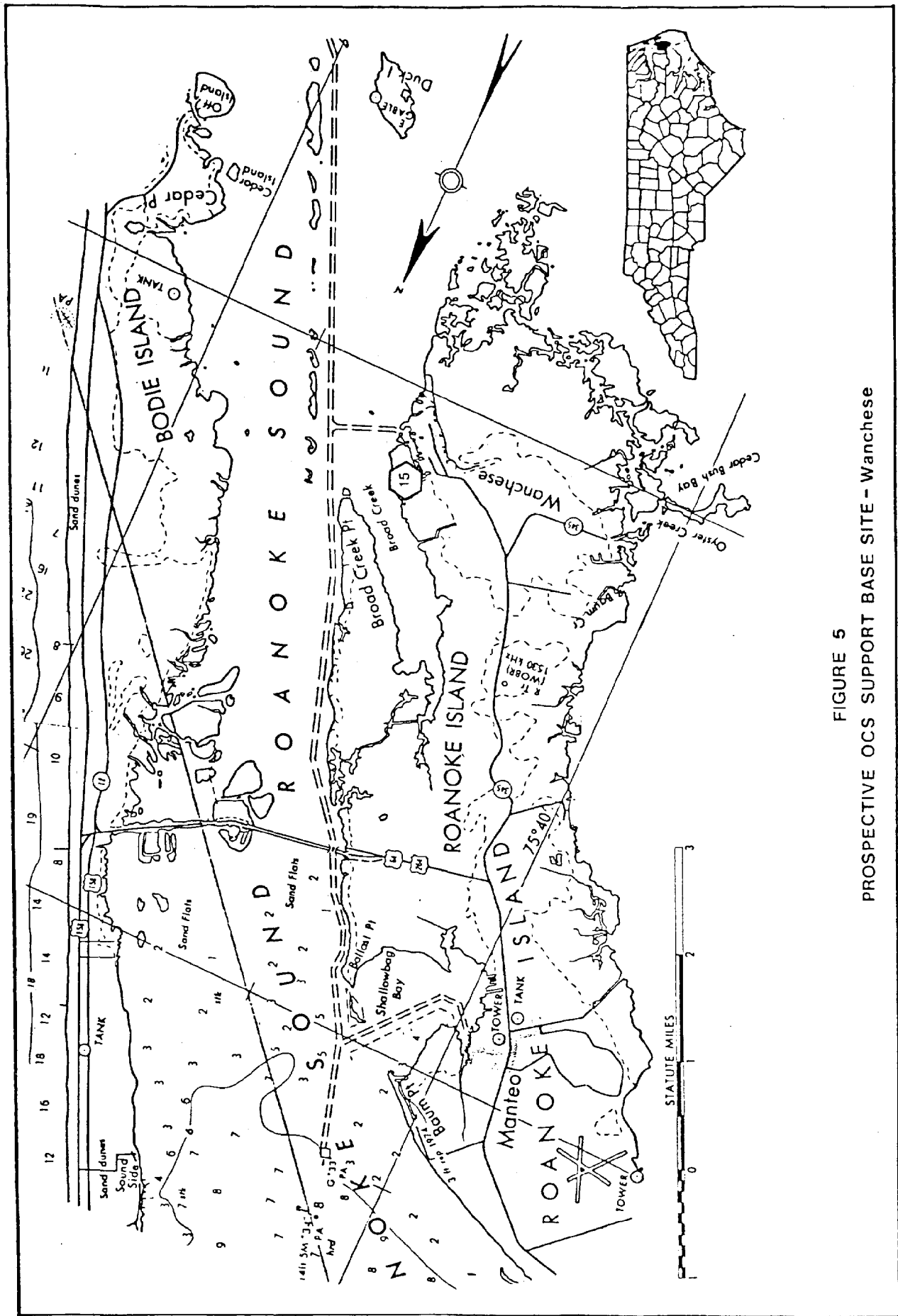


FIGURE 5  
PROSPECTIVE OCS SUPPORT BASE SITE - Wanchese

Due to its proximity to the northernmost tracts in the Northern Tract Group, Site 15 is closer to the Lease Area than most of the other prospective sites. However, this advantage is offset by the fact that supply vessels would have to negotiate a relatively unstable channel from the ocean at Oregon Inlet and then face draft limitations caused by the 8½-foot channel restriction. Several miles of dredging would be required to deepen the channel into Wanchese to the desired 15-20 feet.

#### 2.6.3 Southport

Site C-5: North of Pfizer Chemical Company--A 350-acre site just north of Pfizer Chemical Company on the west banks of the Cape Fear River (Figure 6) has been identified as a prospective OCS supply base or coal terminal site. Due to its size and a combination of location factors, Site C-5 might be especially attractive as a coal terminal location but will also be discussed in this section. Most of the site is on relatively high ground (farmland and woods) but is bordered along the river by marshlands and tidal flats and along its northern boundary by the intake canal for Carolina Power and Light Company's nuclear power plant. No wharf or pier facilities are available. The site is approximately 1,500 feet from the 38-foot ship channel and is only five miles from the mouth of the Cape Fear River. Highway access to N.C. 133 is provided by a good two-lane road into the site. The nearest rail access is the U.S. government-owned line serving the Sunny Point Army terminal north of the site. A spur line almost five miles in length and permission to use the federal rail link would be required. If used as a coal site, a tressle over the wetlands and a 1,700-foot T-head pier to the shipping channel would also be required.

Site 6: South of Pfizer Chemical Company--A 200-acre site next to the ferry landing south of Pfizer Chemical Company (Figure 7) was identified in the Phase I report as a tentative OCS support base site; however, it has been learned that this parcel of land, which is owned by Pfizer, is not available for sale. It will therefore not receive further consideration as a potential site for a temporary support base.

#### 2.6.4. Wilmington

Sites 3 and 4: North of Snow's Cut--Two similar, 50 to 100 acre sites just north of the Snow's Cut section of the Atlantic Intracoastal Waterway (Figure 7) were identified in Phase I as prospective OCS support base sites. The sites are located between the 12-foot Atlantic Intracoastal Waterway (AIWW) channel and the U.S. Coast Guard Station. Good highway service is provided by River Road which connects to U.S. 421. The nearest rail service is about seven miles away. These sites are currently without wharf facilities and lie almost a mile from the 38-foot ship channel in the Cape Fear River.

Site 2: South of Barnard's Creek--Site 2 encompasses about 50 acres on the east side of the Cape Fear River just south of Barnard's Creek (Figure 8). The site is in a larger 2,000-acre area surrounded by residential development and by the Echo Farms and Country Club Property. Rail service ends about one mile north of the site, but River Road provides good highway

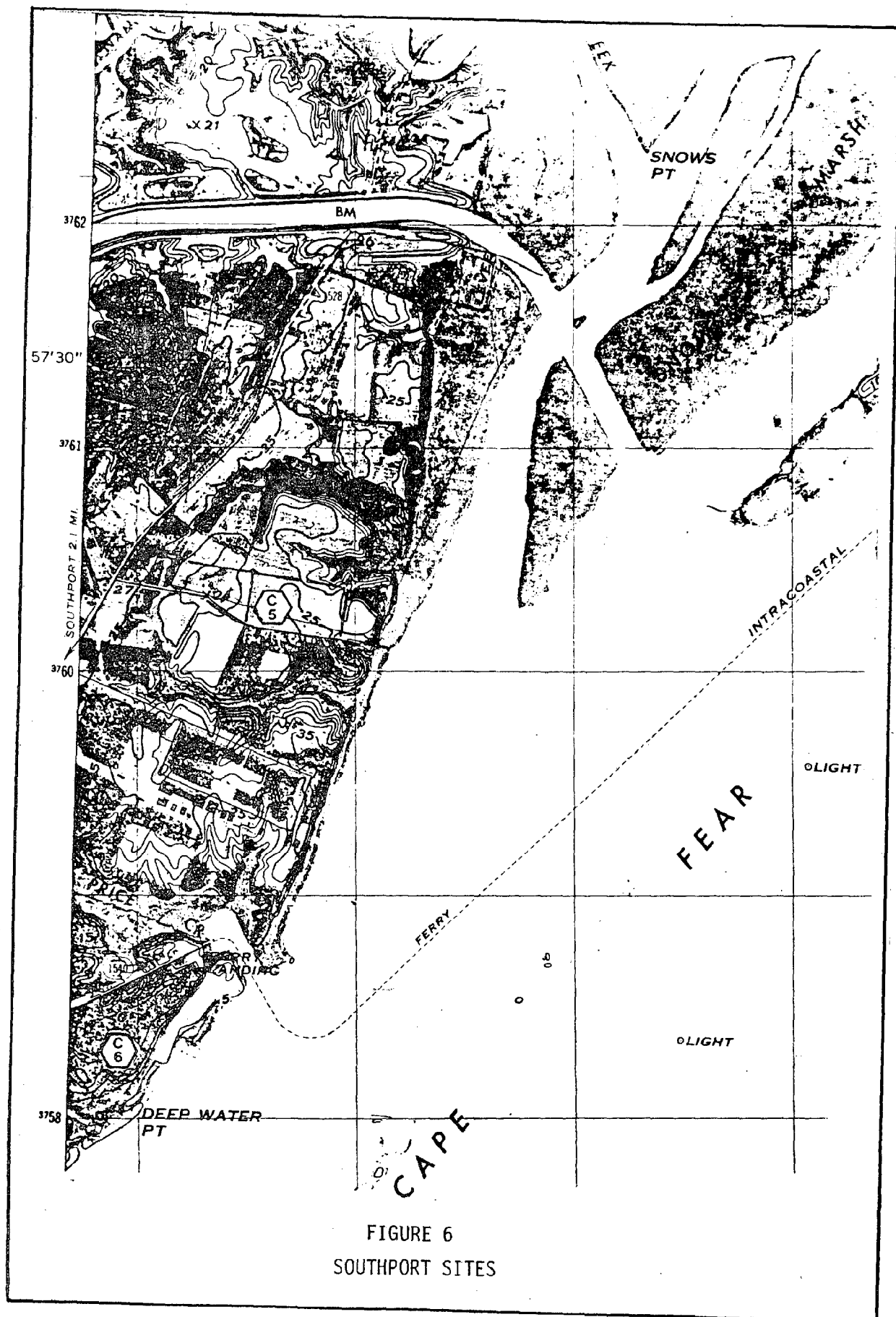
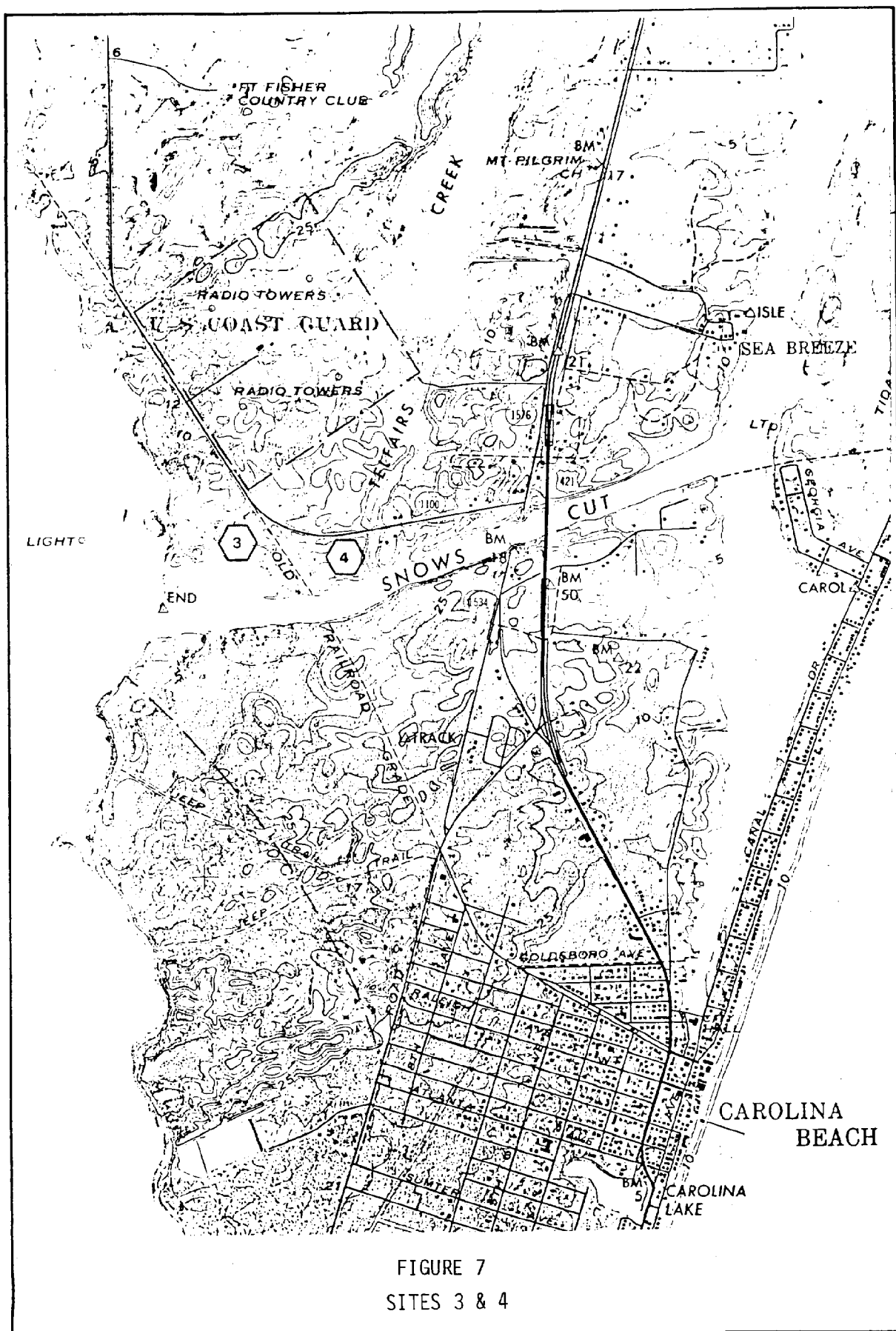
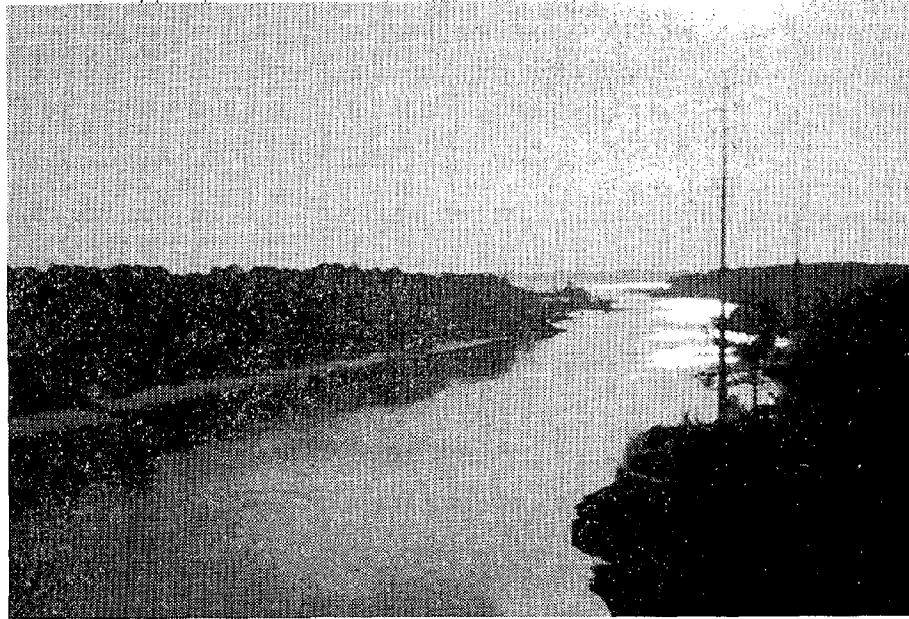
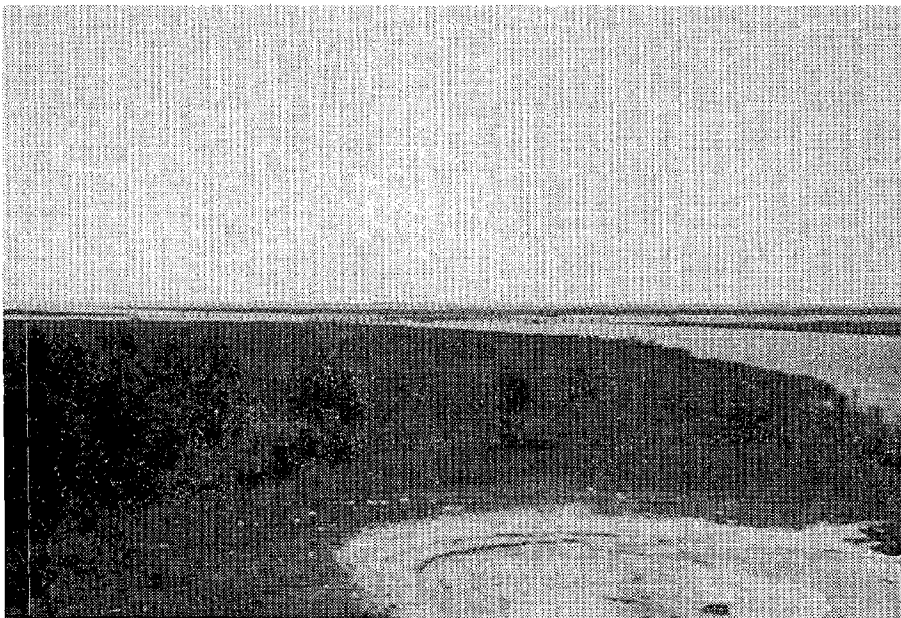


FIGURE 6  
SOUTHPORT SITES





Several of the potential OCS support base sites are located along the Cape Fear River. Sites 3 and 4 (above) along the Intracoastal Waterway at Snow's Cut and Site 10 (below) on the Northeast Cape Fear River are shown.





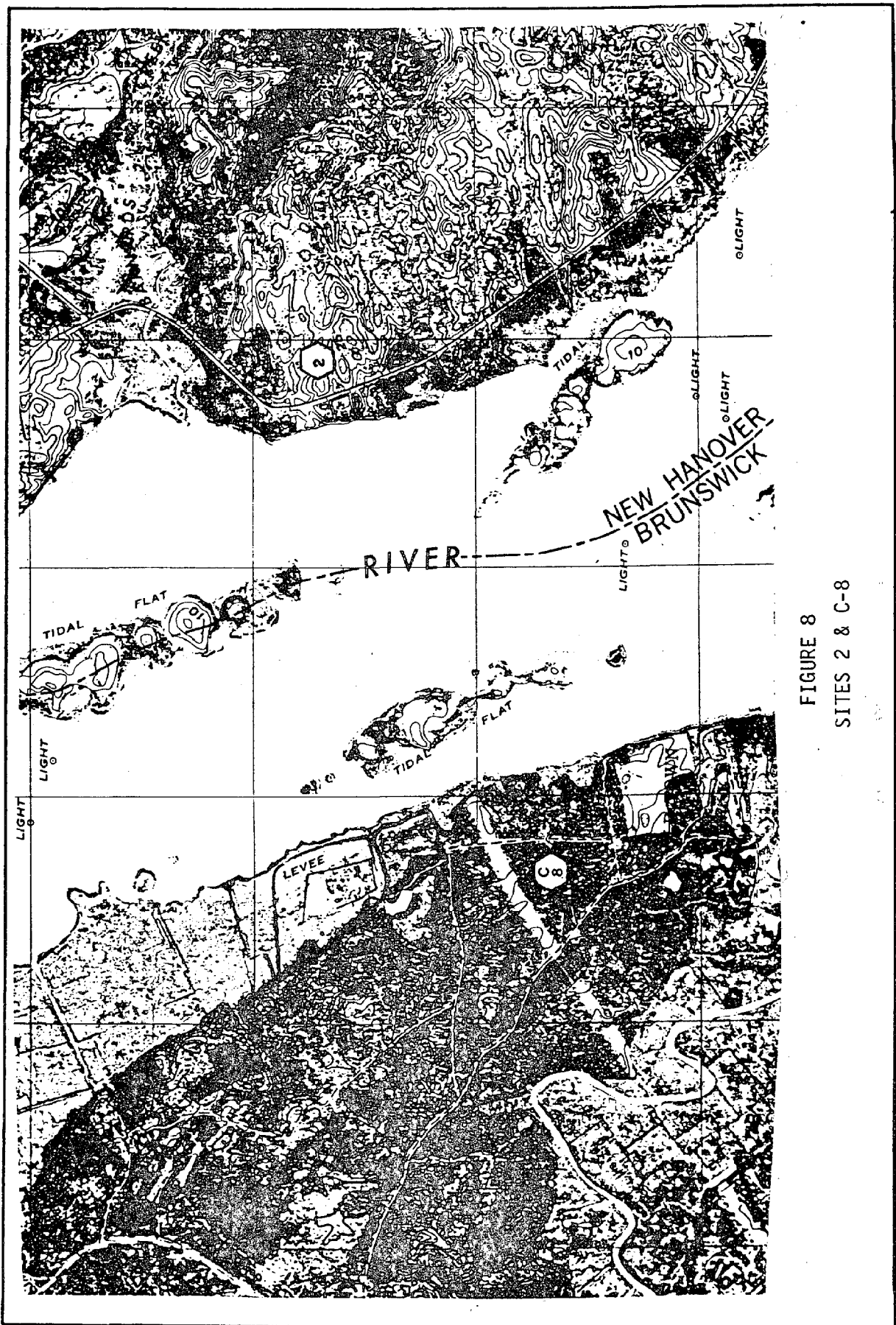


FIGURE 8  
SITES 2 & C-8



access. Site 2 is approximately 20 miles from the ocean and would require extensive dredging to reach the ship channel almost 3,000 feet away. Primary nursery ground in the Cape Fear River may restrict dredging activities.

Site C-8: North of Town Creek--A 250-acre site on the west side of the Cape Fear River that might serve as either a coal terminal or an OCS support base is identified in Figure 8. The site is mostly on high ground with marsh areas and tidal flats bordering the site on the north and south sides. Land in this area has not yet been developed; there is no rail or highway access into the site although the government-owned railroad is about three miles west and N.C. 133 borders the site on the west. River frontage totals 3,000 feet and distance to the deepwater channel is also about 3,000 feet.

Site 1: Eagle Island--Relatively undeveloped Eagle Island (Figure 9) includes over 1,000 acres of land that have been created by spoil disposal from the Cape Fear River. This area has been used by the Corps of Engineers for many years, and new dredge disposal areas would have to be found if Eagle Island were to be utilized for other purposes. Its strategic location across the river from the existing State Ports Authority terminal actually makes it an extremely attractive site for future expansion of Wilmington public port facilities. U.S. 17, 74, and 76 provide excellent highway access at the north end of the island, and nearby rail access from the Seaboard Coastline Railroad is possible. The east side of Eagle Island is very close to the ship channel. Even if the island were designated for future development of the SPA terminal, there also appears to be adequate space for possible location of a temporary OCS supply base.

Site 9: South of N.C. 133 on Brunswick River--Just west of Eagle Island across the Brunswick River (Figure 9), the SPA owns approximately 220 acres of land, a portion of which might be considered as a prospective support base site. Near the community of Old Towne, the site has good access to N.C. 133 but would require a two-mile rail spur. Also, the Brunswick River would require extensive dredging because of silting in much of the lower portion of the river. No wharf facilities are presently available, and the site is almost 3,000 feet from the ship channel in the Cape Fear River. Significant environmental problems would have to be addressed at this location.

Site C-17: North End of Existing SPA Terminal--In the next chapter, Site C-17 will be described in terms of its potential as a coal terminal site. If present plans of the Carolina Coal Export Corporation to utilize this location for an export terminal fail to materialize, it should receive serious consideration as an OCS support base site. For the same reasons documented in the discussion of Site 23 in Morehead City--the existence of most of the necessary port and marine service infrastructure requirements--this site should receive serious consideration. It has more than 1,000 lineal feet of wharf along the 38-foot channel of the Cape Fear River as well as good storage, service, and transportation access. Port officials have indicated that, should the site be developed as a coal terminal, other open areas at the SPA terminal could be designated for support base activities.

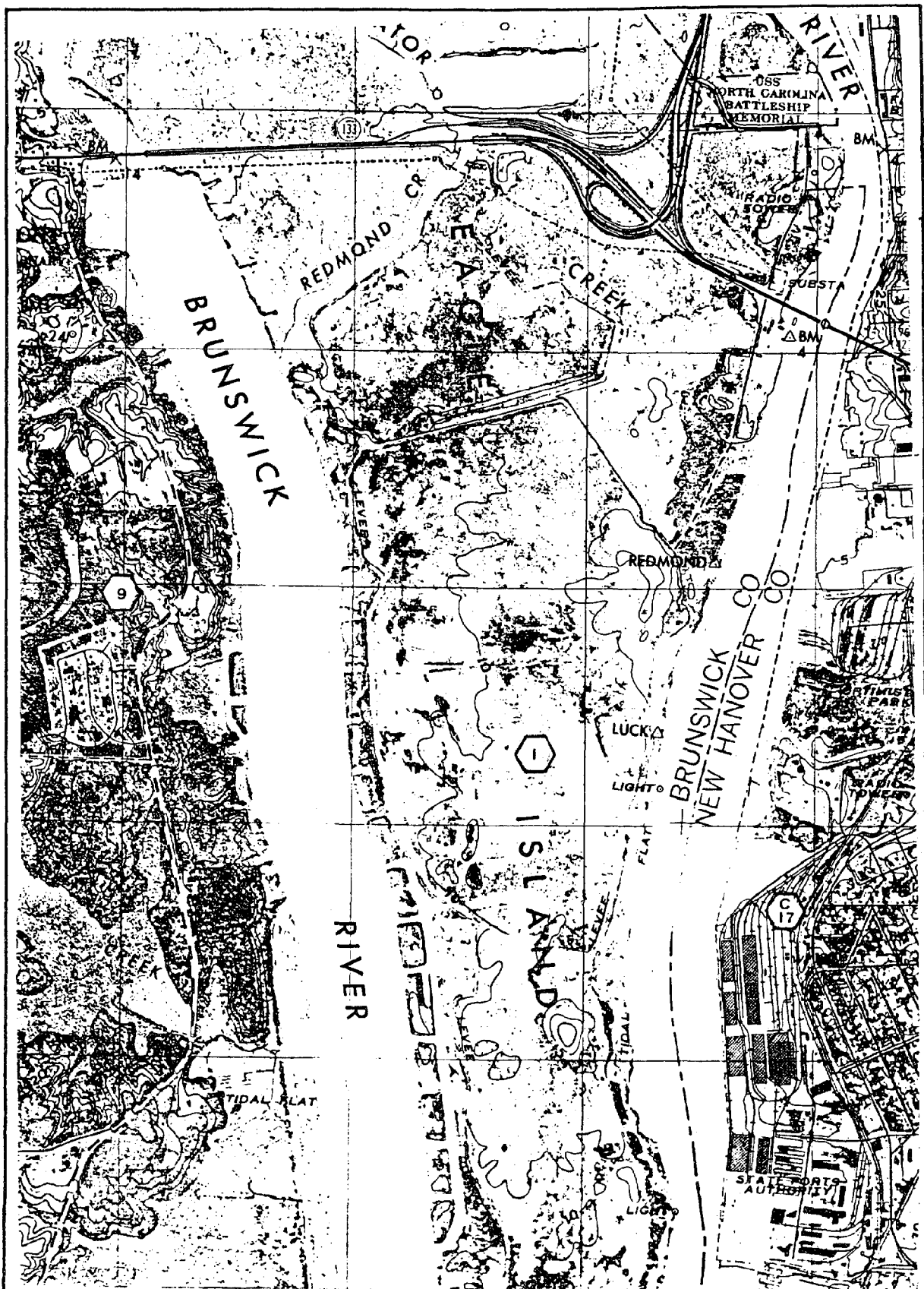


FIGURE 9  
SITES 1, 9 & C-17

Site 10: North of W. R. Grace Company on Northeast Cape Fear River--  
Situating on high ground along the west bank of the Northeast Cape Fear River, Site 10 is located just north of W. R. Grace Company (Figure 10). It contains 70 to 80 acres of undeveloped land and has excellent highway and rail access to U.S. 421 and the SCLRR which border the site on the west. Although no wharf facilities exist, the site is only about 3,000 feet from the upstream limit of the federal dredging project and the nearby ship turning basin where a 25-foot channel is maintained. An important concern in considering Sites 10 and 11 for prospective OCS supply bases is their excessive distance (30 to 35 miles) from the open ocean.

Site 11: West of General Electric Company on Northeast Cape Fear River--Just upstream from Site 10 and located on the east side of the Cape Fear River (Figure 10) Site 11 is the final OCS support base site under consideration at this time. It contains approximately 50 acres of high ground that would have to be provided with about two miles of access road to reach N.C. 133 and about three miles of rail spur to connect with Seaboard Coast Line Railroad (SCLRR) tracks. It is also two miles further upstream from the existing dredged channel and turning basin.

## 2.7 Site Recommendations

Sixteen prospective site locations were listed in Table 5 and briefly described in the preceding section of this chapter. Following field inspection, each of the sites was reviewed to ascertain its compliance with the checklist of industry needs shown in Table 6. Specific port and marine infrastructure requirements (Table 4) needed to establish temporary OCS service bases along the North Carolina coast were used as guidelines in this process. It should be noted that four of the 16 sites under consideration (C-5, C-8, C-13, and C-17) will also be evaluated in Chapter 3 as potential coal terminal locations.

Table 7 utilizes 16 measures of merit in an updated parametric analysis of the support base sites. A preliminary analysis was presented in Table 3-4 of the Phase I report, but that analysis has been modified with respect to sites and merit measures to reflect the most current information available in April 1981.

If all of the merit measures were equally weighted, a simple summation would reveal the best of the candidate sites. But this is obviously not the case, and engineering judgment is needed to narrow the list of candidates. Clearly the two outstanding sites in Table 7 are Sites 17 and 23. Because of their location on an existing SPA terminal at Wilmington and Morehead City respectively, each is in the enviable position of having most of the necessary port and marine service infrastructure requirements already provided. Having relatively little demand for capital expenditures and the ability to begin operation almost immediately will make each of these sites especially attractive to the oil and gas drilling companies. Each has at least 1,000 feet of wharf and 35 feet of channel depth available at the site. Each is in a port area previously zoned for industrial use; good rail and highway facilities are available; and storage areas, cranes, fresh



FIGURE 10  
OCS SITES 10 & 11

TABLE 7. ANALYSIS OF OCS SUPPORT BASE SITES

	Wilmington										Southport			Morehead				Wanchese
	1	2	3	4	8	9	10	11	17	5	6	21	22	13	23	15		
Acreage	1	1	2	3	2	1	1	1	2	2	1	3	3	2	2	3		
Topography	3	1	1	1	2	2	1	1	1	2	1	1	1	2	1	1		
Land Use	2	3	1	1	2	2	1	1	1	1	2	1	1	1	1	2		
Rail Access	3	2	3	3	2	2	1	2	1	2	2	1	2	3	1	3		
Access to Open Water	2	2	2	2	2	2	3	3	2	1	1	1	2	3	1	3		
Proximity to Channel	1	3	1	1	2	1	1	1	1	3	1	1	3	3	1	1		
Channel Depth (feet)	1 (38)	3 (3)	2 (12)	2 (12)	3 (1)	2 (16)	3 (5)	3 (5)	1 (38)	1 (38)	1 (38)	1 (40)	3 (6)	2 (12)	1 (35)	2 (8½)		
Highway Access	1	2	2	2	2	1	1	2	1	2	2	1	1	3	1	2		
Environmental Sensitivity	3	3	2	2	2	2	1	1	1	1	2	1	1	3	1	3		
Archeological or Historical Site	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	3		
Competing Energy Use	2	1	1	1	2	2	2	2	3	1	3	3	2	3	2	1		
Distance to Lease Area																		
Air (miles)	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	2 (113)		
Water (miles)	3 (155)	3 (150)	3 (144)	3 (144)	3 (150)	3 (155)	3 (160)	3 (163)	3 (155)	2 (136)	2 (136)	1 (62)	1 (62)	1 (62)	1 (62)	2 (131)		
Proximity to Airport	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	3		
Proximity to Amenities	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	2		
Permittability	3	3	2	2	3	3	2	2	1	3	2	1	1	3	1	2		

water, and bunkering facilities are already provided. With the possible exception of Site 22 which has been earmarked as an \$18 million bulk phosphate facility for the North Carolina Phosphate Company,<sup>6</sup> all other sites in Table 7 would require substantial investments of time and capital to acquire the necessary infrastructure.

Although there is little to choose between the two sites, it is recommended that Site 23 be given top priority as a support base site because of its proximity to the Northern Tract Group in Lease Area No. 56. Both its air and water distances to the lease area are approximately half of those for Site 17, and Site 23 is much closer to the open ocean. It is further recommended that, if exploratory drilling for OCS oil and gas is undertaken in 1981 or soon thereafter, the State of North Carolina, through its appropriate agencies, should take the steps necessary to make five to ten acres of land at Site 23 on the SPA terminal property in Morehead City available for use as a temporary onshore support base site. If a second support base is needed, steps should also be taken to make a similar amount of land available on the SPA terminal in Wilmington at or near Site 17.

## 2.8 Needed Improvements

If Sites 23 and 17 are selected, little in the way of transportation and other improvements will be required to make either of the sites viable support bases. As previously stated, most of the required infrastructure is already in place, but minor changes in access roads, rail spurs, utility and communication lines, waste treatment facilities, etc., may be needed to serve the expected crew and supply boats and helicopters. Detailed engineering plans for the support bases have not been prepared at this phase of the study, and no cost estimates have been developed. It does appear, however, that no additional publicly financed transportation facilities will be needed to serve either of these sites.

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<sup>6</sup>"Carolina Cargo," January 1981, p. 24.

### 3.0 LOCATION ALTERNATIVES FOR COAL EXPORT TERMINALS

#### 3.1 Export Demand

World demand for United States steam coal has mushroomed since late 1979. Seaborne coal exports increased from 45 million tons in 1979 to 67 million tons in 1980, resulting in a backup of ships waiting to load at major U.S. coal ports. Especially at east coast coal facilities in Hampton Roads and Baltimore, vessel delays have become a way of life. Average demurrage in March 1981 was quoted at \$15,000 per day per ship.<sup>7</sup> Thus, a collier loading 75,000 long tons, waiting 40 days, and paying \$15,000 per day in demurrage charges (total = \$600,000) would add an \$8 charge to each long ton of coal delivered. It is not surprising that a major Japanese coal user (Nippon Steel) recently announced that its demurrage bills for 1980 exceeded \$40 million.<sup>8</sup>

Unfortunately, coal export terminals along the east coast of the U.S. are not only inadequate in terms of throughput capacity but also in terms of adequate channel depths. Vessel draft restrictions, created by channel depths of less than 45 feet, generally limit bulk carriers to Panamax-sized vessels (ships that can be accommodated fully loaded in the Panama Canal) of approximately 70,000 deadweight tons (dwt). These size restrictions add additional dollars to the delivered price per ton when compared with economy of scale advantages accruing to competitive colliers in the 120,000 to 150,000 dwt class that can be accommodated at deeper ports.

##### 3.1.1 Production and Export Projections

In an effort to determine the coal export potential for the South Atlantic range of ports, projections of coal demand will be reviewed against a background of U.S. coal reserves and production capacity.

Recent projections indicate that if U.S. coal production continues the 5% compounded annual growth rate it has experienced since 1973, production by year 2000 should approach 2.2 billion tons annually.<sup>9</sup> This production level would more than satisfy a 1.1 billion ton domestic demand for steam and metallurgical coal and a 350 million ton export demand. With actual

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<sup>7</sup>R. Peckham, "United States Coal Ports--Time for a New Beginning," International Bulk Journal, April 1981.

<sup>8</sup>Ibid.

<sup>9</sup>R. L. Major, "U.S. Coal Reserves and Production Capabilities," paper presented at AAPA Conference on Coal and Ports, Mobile, Ala., February 17, 1981.

U.S. production in 1980 at 830 million tons, most observers foresee little restriction in supply potential although concern has been expressed over U.S. supply stability during periods of labor negotiations.

A range of recently published production and export projections are summarized in Table 8. These have been extracted from the following major studies:

1. C. L. Wilson, Coal Bridge to the Future, Report of the World Coal Study (WOCOL), 1980.
2. "Interagency Coal Export Task Force Report on Ports and Ocean Transportation" (ICE), December 1980.
3. Forecasts by Economic Committee of the National Coal Association (NCA), 1980.
4. "The United States in the World Coal Market," distributed by Coal Exporters Association, 1979.

Despite the variability in those projections, it is readily apparent that coal exports, especially steam coal, will rise dramatically in the years ahead.

### 3.1.2 Export Constraints

Production projections in Table 8 indicate that the United States could become the world's leading coal producer since it is unlikely that supply will be a future problem. Other factors, such as delivered cost and the impact of federal policy towards exports and market competition, could develop into major constraints. Delivered cost can be enhanced by the elimination of demurrage and the accommodation of larger vessels. Federal policy is more elusive, but certainly the posture of U.S. coal exports will be dependent in large measure on governments' response to two sensitive issues: channel dredging and the need to streamline environmental permitting.

### 3.2 Alternative Development Scenarios for North Carolina Ports

Detailed estimates of total U.S. coal export terminal capacity, which were compiled by the Interagency Coal Task Force, were presented in Chapter 1. Expected increases in terminal capacity on the East Coast that are either planned or underway will be reviewed before alternative development scenarios for the North Carolina ports are determined.

#### 3.2.1 Terminal Developments--U.S. East Coast

Planned coal port expansion on the east coast is a dynamic process and much of the information related to these plans is necessarily proprietary. Significant uncertainties concerning timing, capital expenditures, and land acquisition make any compilation of future terminal capacity a risky endeavor; however, some attempt to determine present terminal commitments, especially



**TABLE 8. COAL PRODUCTION AND EXPORT PROJECTIONS**

Year	Production (million tons annually)	Exports (million tons annually)		
		Metallurgical	Steam	Total
1980	830			90
1985	971-1118 (5)	55.2 (avg. of 9)	39.1 (avg. of 12)	94.3
1990	1223-1620 (4)	62.4 (avg. of 9)	68.8 (avg. of 12)	131.3
2000	1905-3077 (4)	74.4 (avg. of 4)	173.2 (avg. of 7)	247.6

Sources: WOCOL, ICE, NCA, and "International Bulk Journal"

Note: Number of forecasts are in parentheses.

in competing east coast ports, is essential to the development of export capacity scenarios for Wilmington and Morehead City.

According to a review of east coast coal ports, the 1980 annual capacity was 51 million tons for Hampton Roads, 14 million tons for Philadelphia, and 25 million tons for New York. But expansion of existing ports is underway, and new terminals are planned along the entire coast. As illustrated in Table 9, specific plans for new coal terminals along the east coast are well developed and, if only a portion of them become a reality, the impact on local area economies and life styles may be substantial.

### 3.2.2 Potential for New Ports

Bulk handling experience has shown that optimum effective capacity of a coal export terminal is about 65% of its maximum capacity.<sup>10</sup> Above this level, vessel waiting time increases and congestion occurs. This is the present situation at Hampton Roads where loading facilities have been operating at about 90% of capacity. Part of the problem at Hampton Roads is that the loading system was designed to meet the multi-grade standards of the metallurgical coal trade where the required blends of coal are transferred from rail cars directly to the loading vessel. Practically all of the new coal terminals will be designed to handle steam coal, which only requires ground storage and permits much faster rail car turnaround.

It might be inferred from Table 9 that the east coast is rapidly moving from an undercapacity condition in 1980 to one of overcapacity by the late 1980's. Indeed, if all proposals were implemented, this could be a risk. But coal port developments are a function of opportunity and market timing, and many of the new terminal facilities are being implemented only after firm, long-term contracts with importers have been signed.

### 3.2.3 Vessel Requirements

Channel depths of 38 feet in the Cape Fear River and 40 feet in the Morehead City harbor somewhat restrict the size of ships that presently utilize North Carolina's two deepwater ports. This same criticism can be leveled at most U.S. ports where restricted channels limit the draft and therefore the deadweight capacity of entering vessels. Although the United States has the greatest number of coal export terminals, most are restricted to ships of the 50,000 to 70,000 dwt (Panamax) size. Few major coal-loading facilities for ships of 100,000 dwt and over exist anywhere in the world, and these are located in Western Canada, Australia, and South Africa. Most of the discharging terminals accessible to these bulk carriers over 100,000 dwt are concentrated in Western Europe and Japan. The share of these large vessels in world coal trade is steadily increasing (from 21% in 1980 to a

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<sup>10</sup>J. Bowersmith, "Overview of U.S. Coal Port Capabilities and Deficiencies," Proceedings, AAPA Coal and Ports Seminar, February 17-19, 1981.

TABLE 9. CAPACITIES OF PLANNED COAL TERMINALS—U.S. EAST COAST

Terminal	Existing Throughput (million tons annually)	Planned Throughput (million tons annually)
New York-New Jersey		
• Jersey City		
• Stapelton, Staten Island		
• Port Reading	0.25	3-7
Port Camden		
• Alla-Ohio Valley		3
Philadelphia		
• Greenwich		
• Pier 124	3.5	10
• Port Richmond		
• Northern Shipping Co.		1-5
Baltimore		
• Marley Neck (SOROS)		15-35
• Curtis Bay (Ky-Ohio Transp. Co.)	14	12
• Canton Marine Terminal (Consol.)		10-20
• Hawkins Point		10
Hampton Roads		
• Newport News (Chessie)	27	
• Lamberts Point (N & W)	34	
• Newport News (A.T. Massey)		12
• Newport News (Utah Int., et al.)		15
• Craney Island (VPA)		20
Morehead City		
• SPA (Alla-Ohio Valley)		3-12
• Radio Island (Gulf Interstate)		15-20
Wilmington		
• American Coal Export		6
• Utah International		5
• SPA		—
Charleston		
• A.T. Massey		8-12
Savannah		
• Elk River Resources-SCL		12-15
Brunswick		
• Colonel's Island (SOROS)		—

Sources:

"Marine Engineering/Lot," March 1981.

"Journal of Commerce," February 17, 1981.

W. White, Remarks summarizing "Atlantic Coast Port Potential" at Coal and Ports Conference, Mobile, Ala., February 18, 1981.

projected 36% in 1990 and 43% in 2000),<sup>11</sup> and herein lies a basic problem for those concerned with coal terminal location. As vessel sizes increase, a large percentage of the bulk carriers loading in U.S. ports cannot be fully loaded. The maritime industry will be faced with either partially loading the larger vessels and "topping" them off at deeper ports, dredging deeper channels, or building new deepwater terminals offshore.

This is the dilemma faced by North Carolina's ports, and its resolution to a large degree will control the number and location of future coal terminals. Since several companies have already made commitments to export steam coal from Wilmington and Morehead City, it is apparent that they have opted, at least temporarily, to utilize smaller ships. The possibility of constructing a terminal with a submarine pipeline to deliver coal in slurry form to larger vessels at an offshore loading buoy is also being explored.

#### 3.2.4 Export Scenarios

It is evidence from Table 9 that traditional eastern coal ports--Hampton Roads, Baltimore, and Philadelphia--have plans to expand existing facilities and build new terminals. It is also evident that coal shippers are turning to ports that have exported little or no coal in the past (e.g., New York, Morehead City, Wilmington, Charleston, Savannah, and Brunswick) as potential locations for new terminals. Although it is beyond the scope of this study, it should be noted that similar plans for increasing export capacity are underway on the Gulf, Pacific, and Great Lakes coasts. Developments at the ports of Mobile, New Orleans, Galveston, and Long Beach in particular suggest that the problem of increased export capacity is not unique to the east coast or to Appalachian coal. As world demand expands, growing amounts of western coal--especially from the Powder River Basin--will be produced and most likely exported from noneast coast ports. In the meantime, because of a well developed rail infrastructure for handling Appalachian coal, additional port capacity will be required along the Atlantic Coast.

Since June 1980, numerous coal shippers, railroad officials, and consultants have explored the possibility of exporting coal from one or both of North Carolina's deepwater ports. Firm commitments or announced plans to locate in North Carolina have been reported by the news media for the locations shown in Table 10.

In addition to these five sites, an official of Wheelabrator-Frye Company announced at a recent coal conference that his firm is considering Alabama and/or North Carolina sites for a future coal slurry export terminal with offshore loading facilities to handle 12 to 15 million tons per year.<sup>12</sup> If all of these plans materialize and no additional site selections are announced, it appears that as much as 54 to 67 million tons of coal could be exported from the state when all terminals are onstream. It should be

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<sup>11</sup>"Interagency Coal Export Task Force Report on Ports and Ocean Transportation," December 1980.

<sup>12</sup>W. McDonough, "A Slurry Export Terminal Concept," paper presented at AAPA Coal and Ports Conference, Mobile, Alabama, February 18, 1981.

**TABLE 10. PLANNED COAL TERMINALS – NORTH CAROLINA**

<b>Startup Date</b>	<b>Terminal Site (Company)</b>	<b>Initial Capacity (mta)</b>	<b>Ultimate Capacity (mta)</b>
<b>Morehead City</b>			
April 1981	1. State Ports Authority Terminal (Alla-Ohio Valley Coal Co.) <sup>a</sup>	3.0	10-12
April 1984	2. Radio Island (Gulf Interstate, Inc.) <sup>b</sup>	15.0	15-20
<b>Wilmington</b>			
April 1982	3. Northeast Cape Fear River (American Coal Export Co.) <sup>c</sup>	1.5	6
	4. Pleasant Oaks Plantation Brunswick Co. (Utah International) <sup>d</sup>		5
	5. State Ports Authority Terminal (no contract announced) <sup>e</sup>		6-9

<sup>a</sup> Estimates announced by "Journal of Commerce," February 17, 1981.

<sup>b</sup> Estimates announced by "Journal of Commerce," April 3, 1981 and "Engineering New Record," March 12, 1981.

<sup>c</sup> Estimates announced by "Wilmington Morning Star," February 25, 1981 and February 28, 1981.

<sup>d</sup> Estimates announced by "Wilmington Morning Star," March 12, 1981 and March 21, 1981.

<sup>e</sup> Estimates announced by "Wilmington Morning Star," January 20, 1981.

noted that 54 to 67 million tons represent a maximum capacity and the effective capacity would probably be about 65 percent of this total.

A summary of these estimates arranged in logical time frames has been assembled in Table 11. Obviously, delays in environmental permitting, financing, or construction of one or more of the projects could significantly reduce these estimates, and the totals for the decade probably represent an optimistic scenario of coal exports.

### 3.3 Long-Range Needs

As of May 1981, only the three sites identified in Table 10 with fixed startup dates have announced specific intentions to begin exporting coal. Alla-Ohio Valley Coal Company loaded its first vessel in early May 1981, while American Coal Export Company and Gulf Interstate, Inc. expect to be operational in 1982 and 1984 respectively. Detailed plans for the other firms in Table 10, plus any plans of companies yet to make public announcements, suggest the need for a delineation of long-range needs in terms of land, port facilities, channel depths, utilities, transportation links, easements, and other peripheral facilities.

In the Phase I Report, a throughput of 6 to 10 million tons of coal annually was assumed for the prospective terminal(s) in Morehead City and a similar amount for the Wilmington terminal(s). In light of more recent data, these estimates will have to be increased and the infrastructure requirements modified. Table 12 presents recommended long-range requirements for coal export terminals.

### 3.4 North Carolina Sites

Prospective coal terminal sites listed in Table 13 are numbered so as to provide consistency with the OCS support base sites listed in Table 5. Four of the sites (C-5, C-8, C-13, and C-17), which were identified both as potential support base and coal terminal sites, have already been described in Chapter 2. The remaining 7 coal terminal sites will be described in the following paragraphs.

#### 3.4.1 Morehead City (Figure 11)

Site C-12: Gulf Interstate Engineering Company Site on Radio Island: The Phase I Report indicated that Gulf Interstate Engineering Company had announced plans for a liquified petroleum gas terminal on this site in 1978. However, in February 1981, the Houston-based company made public plans to construct a \$60 to 70 million coal export facility on Site C-12. The company intends to develop a privately-owned 74-acre parcel (Figure 12) on Radio Island with storage and loading facilities capable of handling 15 to 20 million tons of coal annually. A T-head loading pier would be constructed on the west side of the site parallel to the 40-foot ship channel. Excellent rail and good highway access is available on Radio Island. Following the issuance of environmental permits, construction would take 18 to 24 months with the first coal shipment expected in 1984.

**TABLE 11. COAL EXPORT CAPACITY ESTIMATES**  
(million tons annually).

Date	Morehead City Sites			Wilmington Sites			Total
	Alla-Ohio	Gulf Interstate	American Coal	Utah International	SPA Terminal	Offshore	
1981	1.5	—	—	—	—	—	1.5
1982	3.0	—	1.5	5	3	—	7.5
1983	3.0	—	1.5	5	6	6	21.5
1984	6.0	15	6.0	5	6	12	45.5
1985	7.0	15	6.0	5	6	12	51.0
1986	8.0	15	6.0	5	7	12	53.0
1987	9.0	15	6.0	5	8	12	55.0
1988	10.0	15	6.0	5	9	13	58.0
1989	11.0	20	6.0	5	9	14	65.0
1990	12.0	20	6.0	5	9	15	67.0

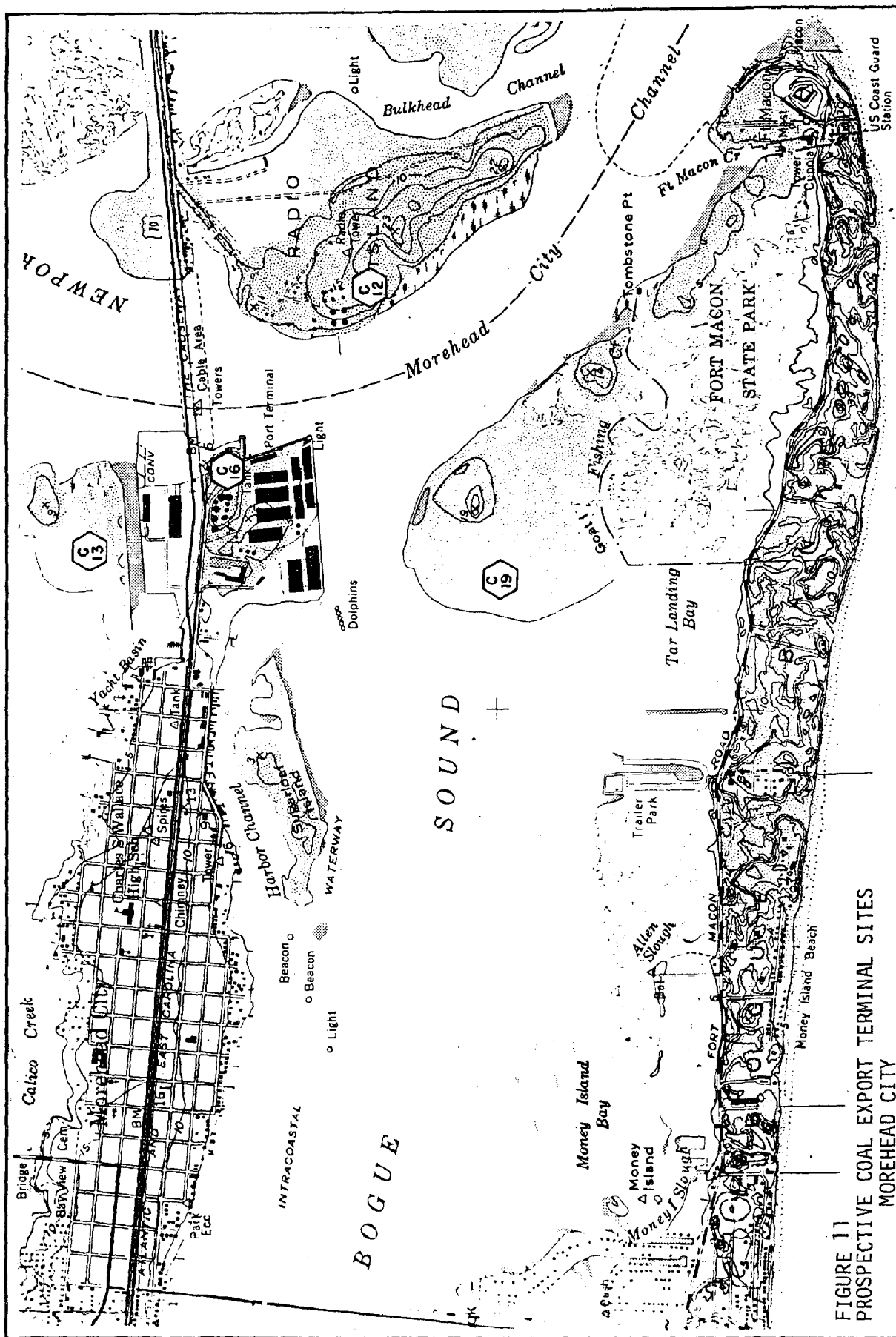
**TABLE 12. PORT AND MARINE SERVICE INFRASTRUCTURE REQUIREMENTS  
FOR COAL EXPORT TERMINALS**

1. Land	100 to 200 acres of relatively flat land for ground storage of steam coal.
2. Wharf length	1,000 linear feet per berth.
3. Channel depth	38-40 feet.
4. Turning basin	Accommodate vessels up to 60,000 dwt.
5. Reclaiming and loading capacity	6,000 net tons per hour.
6. Rail facilities	Accommodate 100-car unit trains dumping 10,000 tons each into hopper. Coal can be conveyed either to stockpile or directly to shiploader.
7. Vehicular traffic	Internal roads should be paved, curbed, and guttered to facilitate routine cleaning and dust suppression.
8. Drainage	Settling ponds sized to accept runoff from entire site.
9. Noise levels	Maximum allowable noise emissions should assure that combined operational noise will not be a nuisance to nearby residents.
10. Coal dust suppression	System to suppress coal dust at transfer points, including enclosed conveyors and equipment for washdown.

**TABLE 13. PROSPECTIVE COAL TERMINAL SITES**

Site	Location	Acreage
<b>Morehead City</b>		
C-13	Marsh Island	50
C-16	Alla-Ohio Valley Coal Co. site in existing SPA terminal	5
C-12	Gulf Interstate Engineering Co. Site on Radio Island	74
C-19	Brant Island	50
C-14	Near junction of US 70 and NC 24	200
<b>Southport</b>		
C-05	North of Pfizer Chemical Co.	350
<b>Wilmington</b>		
C-07	Utah International Site—South of Sand Hill Creek	350
C-17	North end of existing SPA terminal	58
C-18	Hampstead/Scotts Hill	100
C-20	American Coal Export Co. site on Northeast	
	Cape Fear River	85
C-08	North of Town Creek	250





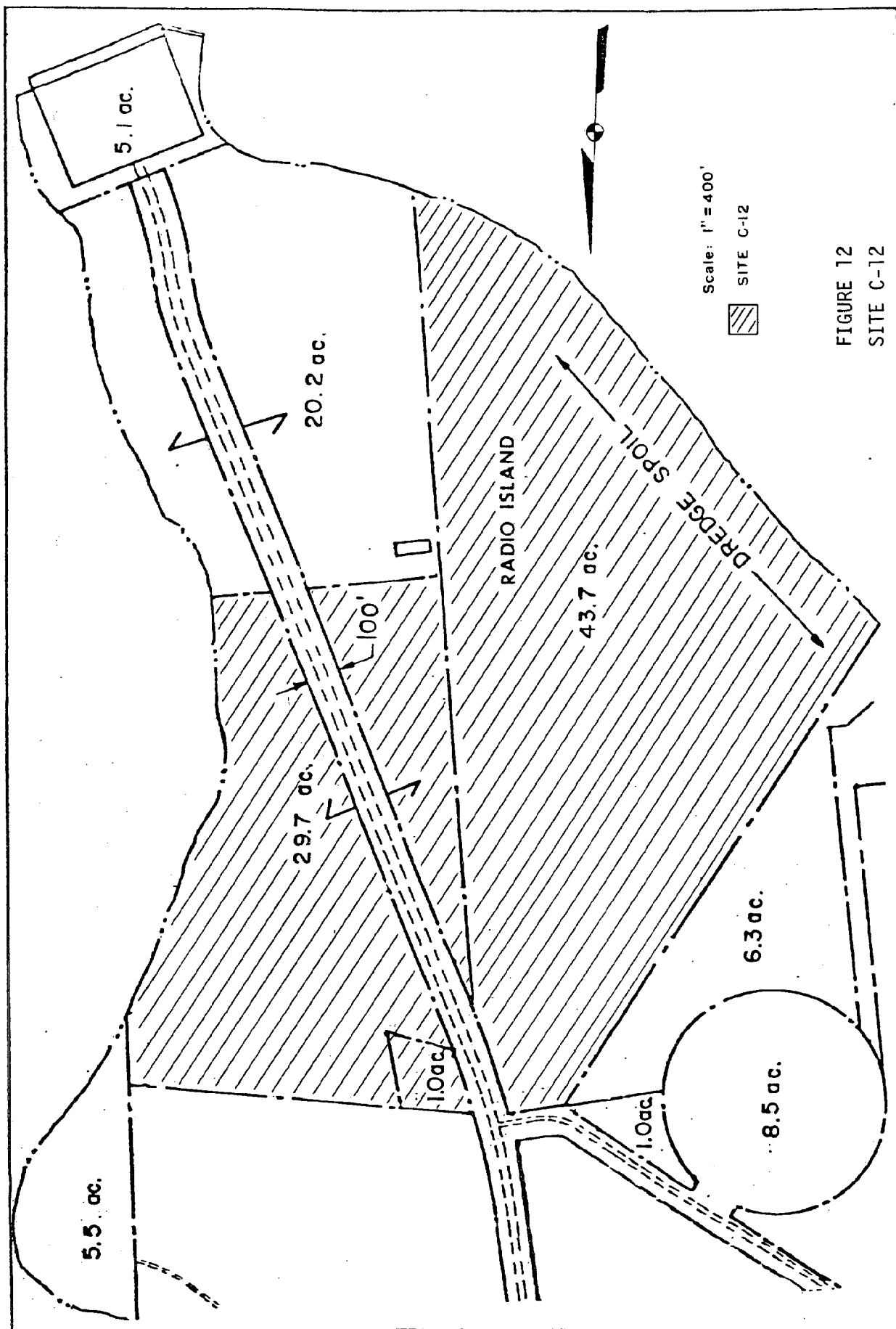


FIGURE 12  
SITE C-12

Site C-16: Alla-Ohio Valley Coal Company Site in Existing SPA Terminal--  
In late 1980, Alla-Ohio Valley Coal Company (AOV) of Washington, D.C. announced plans for construction of a \$3 million coal handling facility on land owned by the State Ports Authority. A sketch of the stacker, reclaimer, conveyor, and coal storage area that comprises the AOV facility on Site C-16 is shown in Figure 13. A four-track addition to the existing rail lines permits the storage and dumping of rail cars at the terminal. Coal is stored on the ground, reclaimed, and transferred to the existing phosphate conveyor system for loading aboard ship. The existing ship berth on the east side of the SPA terminal will accommodate bulk carriers up to about 60,000 dwt. This berth and the existing conveyor belt will be shared with vessels loading phosphate for export.

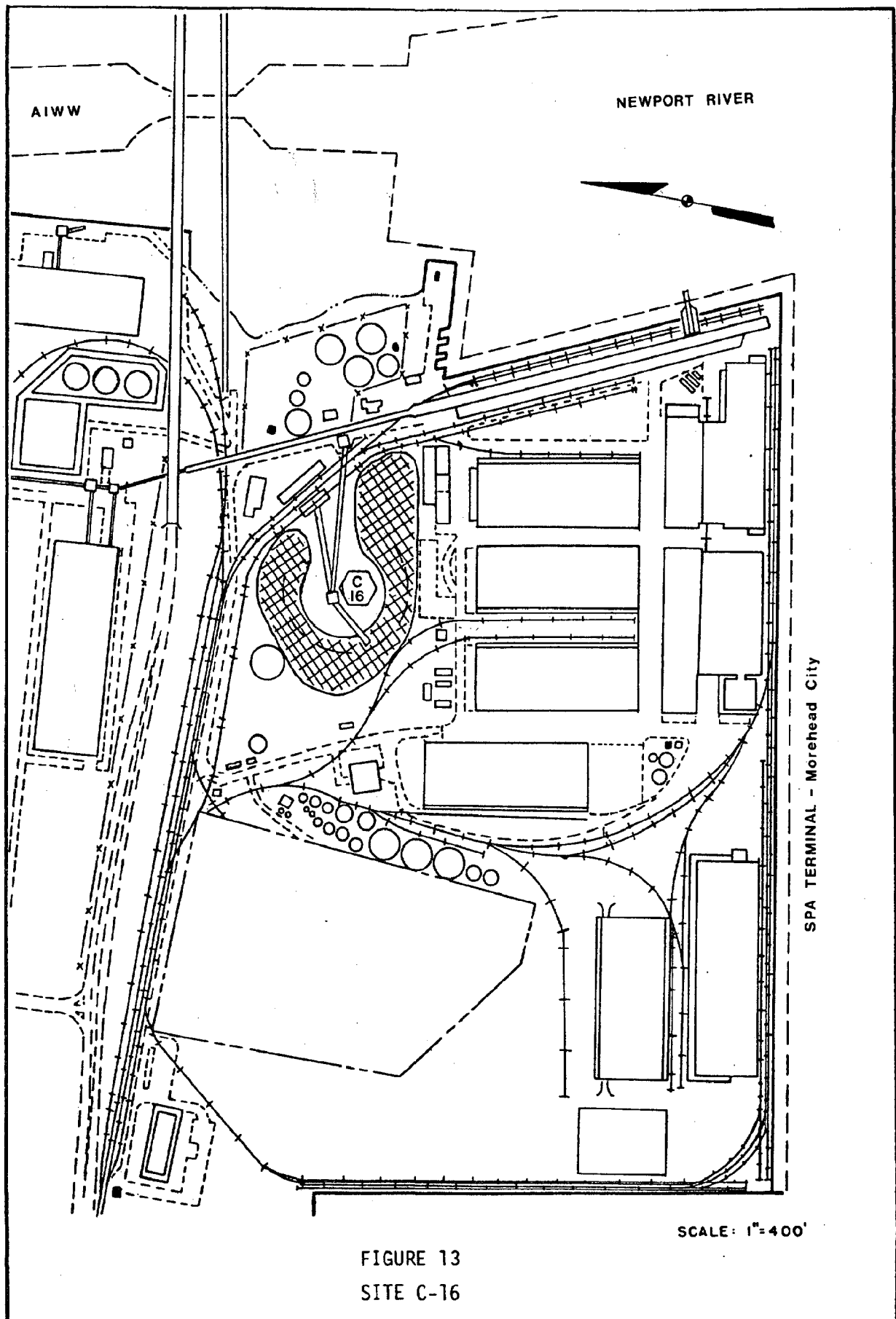
Initially, the AOV terminal will have an annual throughput capacity of three million tons, but the company hopes eventually to increase this level to 10 to 12 million tons. In order to achieve this magnitude of expansion, additional storage area and a new rail line bypassing Morehead City will probably be needed. Because of limited open area at the existing SPA terminal, any expansion of the AOV facility from 3 to 10 million tons throughput will almost certainly have to be provided for elsewhere--perhaps on 38 acres of SPA-owned land on Radio Island. The possibility of a new rail line or alternative facility (slurry pipeline, conveyor belt, etc.) to relieve the present track located in the median of the main street of Morehead City is being addressed in a study performed by SOROS and Associates for Alla-Ohio Valley, the Southern Railroad, and the SPA.

Site C-19: Brant Island--A low-level site within the Morehead City Harbor known as Brant Island is revealed in Figure 11. The island is presently uninhabited, has no highway or rail access, and is bounded on the south by Fort Macon State Park. Although it is conveniently located with respect to the deepwater channel, major environmental problems would have to be overcome, and it probably should be viewed only as a potential site for the long term future.

Site C-14: Near Junction of U.S. 70 and N.C. 24--This site was identified in the Phase I Report as a 200-acre parcel of land just west of Morehead City and adjacent to the A&ECRR (Southern) at the junction of U.S. 70 and N.C. 24 (Figure 14). It would eliminate the movement of coal trains through the city but would require an offshore loading facility for large bulk carriers. It is identified here as a prospective site for ground storage of steam coal, but in order to be a viable undertaking, would require a slurry pipeline or similar technology to connect the storage area with the offshore loading facility. Excellent rail and highway access is available at the site.

### 3.4.2 Wilmington

Site C-7: Utah International Site South of Sand Hill Creek--Utah International, a wholly owned subsidiary of General Electric Company, confirmed in March 1981, that it holds an 18-month renewable option to buy a 350-acre tract of land on the west bank of the Cape Fear River, where it





Export coal bound for Western Europe began flowing out of North Carolina in May 1981. After moving through the State by unit train (above) Appalachian coal is loaded aboard the "S.S. CHIHAYA" (below) at the Alla-Ohio Valley Coal Company facility in Morehead City.



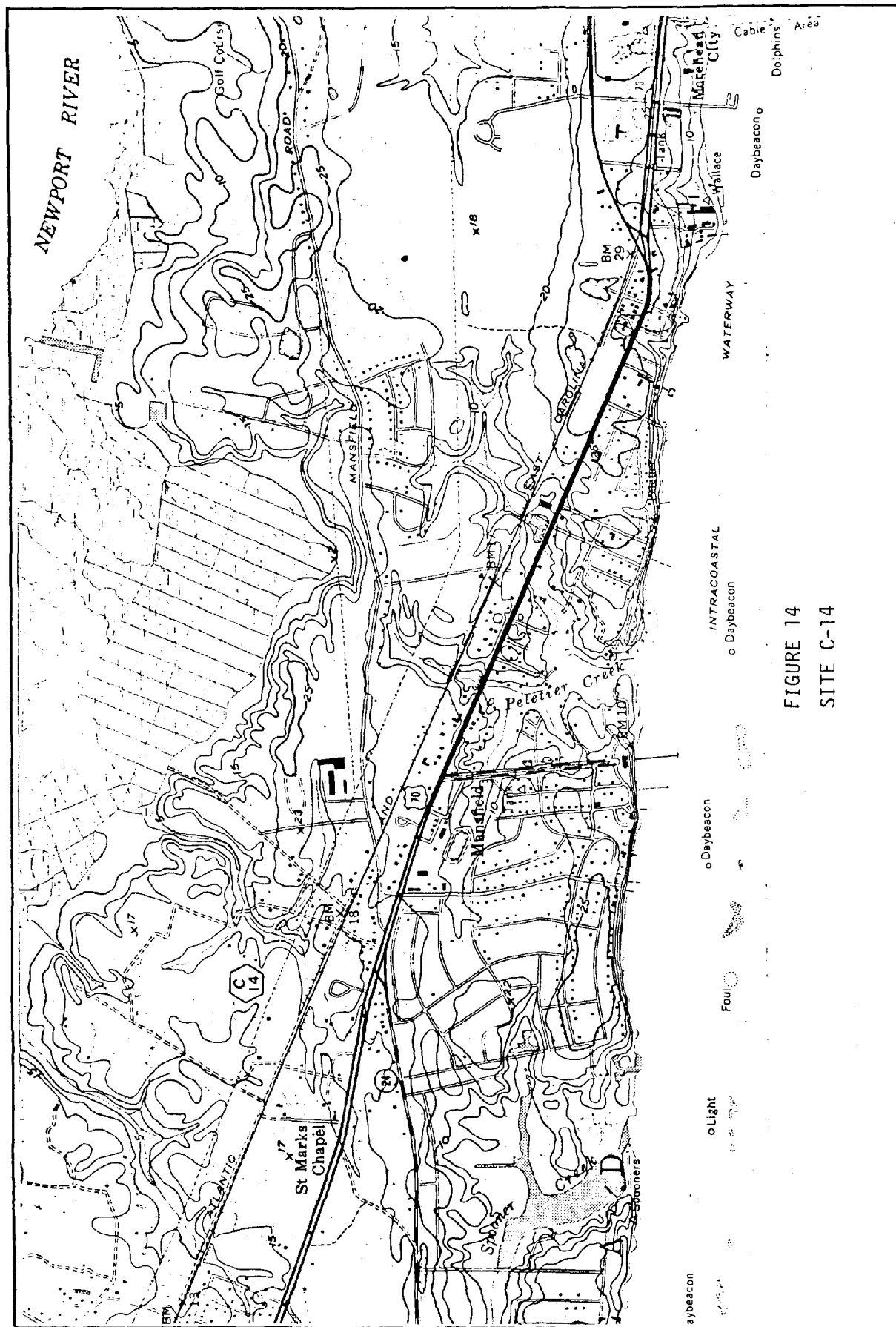


FIGURE 14  
SITE C-14

hopes to build a coal export terminal. This location was previously identified in the Phase I Report and is depicted in greater detail in Figure 15.

The site is part of a larger 3,000 to 4,000 acre tract known as Pleasant Oaks Plantation. Entrance to the plantation is at the junction of N.C. 133 and S.R. 1518, roughly one-half mile south of Town Creek. The property is within a riverfront corridor largely zoned for industrial use in the Brunswick County Land Use Plan. Much of the tract is on high ground, but substantial wetlands are also present.

Besides the Brunswick County site, the company is also considering sites in Baltimore and Newport News. If Site C-7 is selected for development by Utah International, the company would ship coal from their mines in Kentucky and West Virginia via the Seaboard Coastline Railroad system to the export terminal. This presumably would require federal approval for the use of the rail spur leading to the Military Ocean Terminal at Sunny Point.

The company anticipates exporting at least five million tons of coal a year through whichever site is chosen.

Site C-20: American Coal Export Company Site on Northeast Cape Fear River--Preliminary plans for a coal exporting facility on an 85-acre tract on the Northeast Cape Fear River were submitted to government regulatory agencies in February 1981. American Coal Export Company plans to develop a \$20 to \$25 million facility at Site C-20, which is bounded by U.S. 421 and the Seaboard Coastline Railroad tracks (Figure 16). The site is zoned for heavy industry, and the company's option to purchase is good until August 15, 1981. The company hopes to begin exporting 1.5 million tons of coal to Europe by early 1982. With completion of a second phase in 1983, the facility will be exporting about 6 million tons annually.

The site has several obvious advantages with respect to location and transportation access. Excellent highway access is available from U.S. 421 which has a five-lane cross section. The main rail line linking Wilmington with the Seaboard yards at Navassa runs along the south side of Site C-20 and under U.S. 421. Thus, unit coal trains would not have to pass through Wilmington to reach the site. The major limitations of the site relate to constraints imposed upon shipping. The ship channel opposite the site is presently only 22 feet deep, the turning basin is almost a mile north of the site, and any ships loading at the site will have to pass through the restrictive Hilton Bridge (Bascule R.R.) after a 30-mile trip up the Cape Fear River. Relatively shallow channel depths will severely restrict vessel size unless further channel dredging is approved. The channel is now 38 feet deep upriver to the Cape Fear Memorial Bridge. From that point north to the turning basin (Figure 16), the project depth is 25 feet. Apparently, as part of an agreement with other industries upstream (W. R. Grace Company and Rumsey Marine and Drydock), the entire channel north of Cape Fear Memorial Bridge will soon be dredged to 25 feet.

Site C-18: Hampstead/Scotts Hill--With a view towards the possibility of an offshore coal loading facility being constructed in the future, a

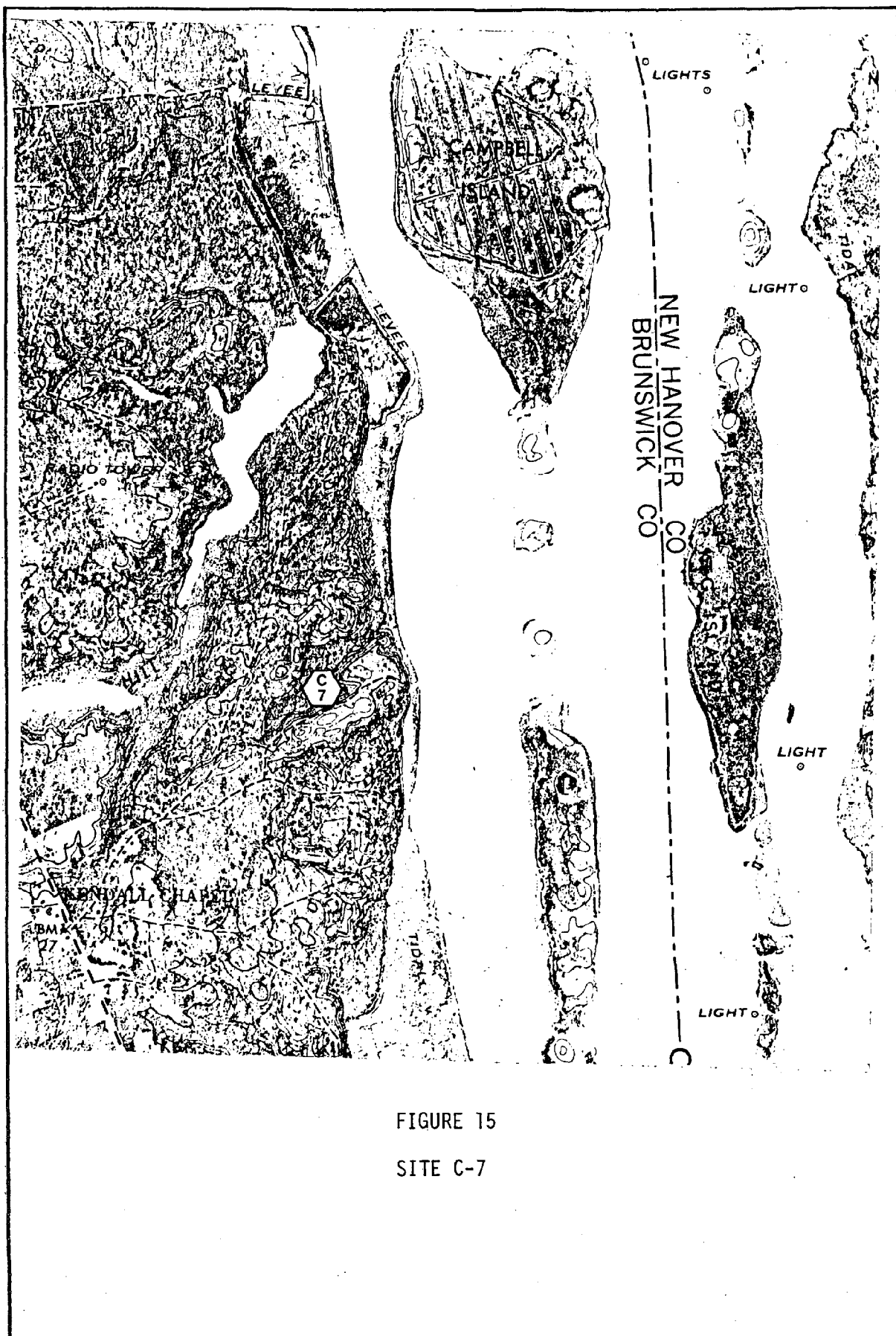


FIGURE 15

SITE C-7





Plans to construct coal export terminals are being considered at several locations along the Cape Fear River. American Coal Export Company plans to develop Site C-20 (above) above the Hilton RR Bridge while Utah International holds an option on Site C-7 (below) south of Sound Hill Creek.



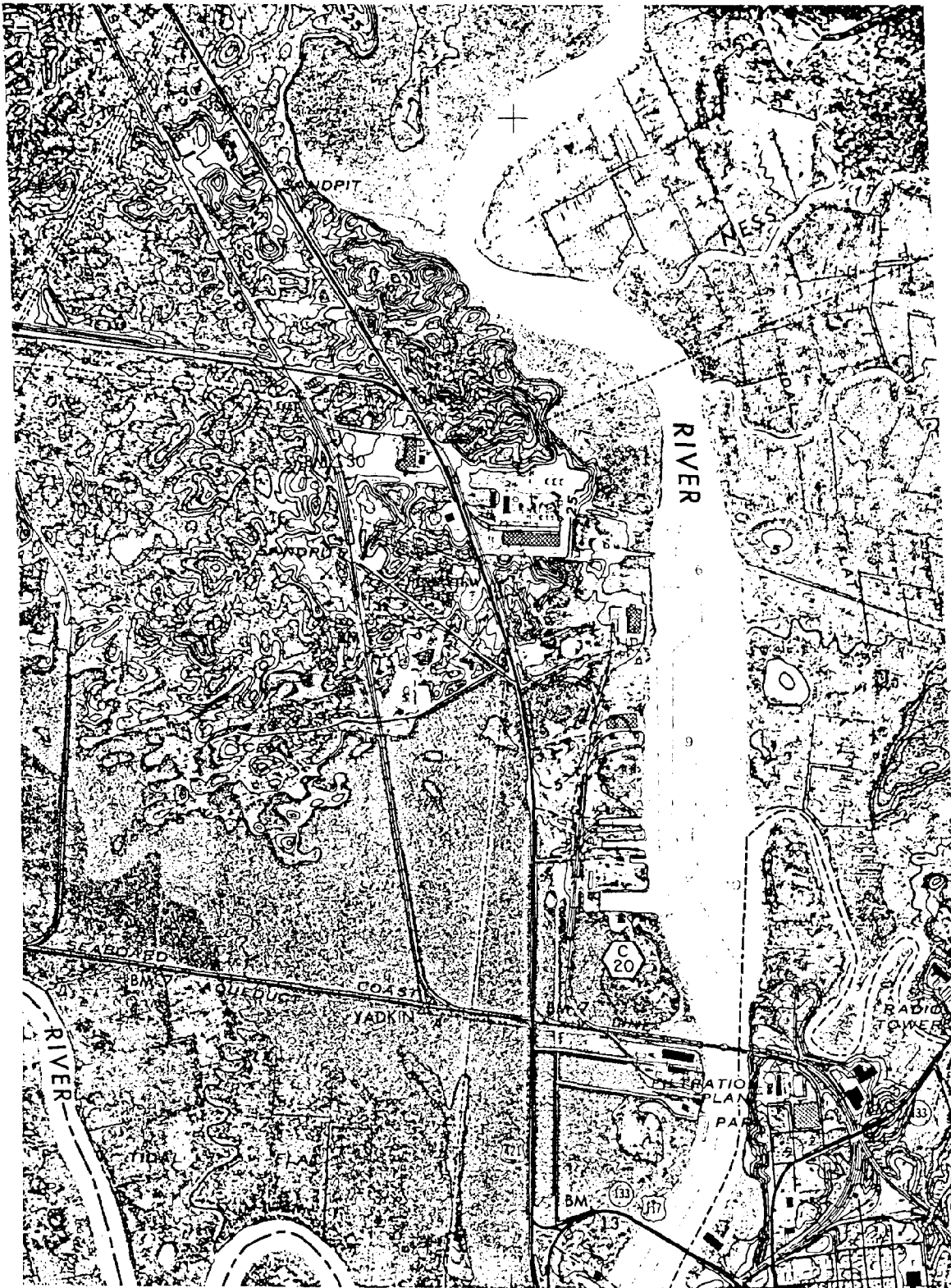


FIGURE 16

AMERICAN COAL EXPORT COMPANY SITE, C-20

tentative site north of Wilmington has been identified for further study. Site C-18 (Figure 17) would be located on a portion of a 2,000 acre tract of land on the east side of U.S. 17 between the communities of Hampstead and Scotts Hill. The site is on relatively high ground overlooking the Atlantic Intracoastal Waterway, some low lying uninhabited islands, and the ocean to the east.

If utilized for a coal terminal at some future date, coal would arrive by unit train on a rail spur from the SCL main line and be dumped at the site. A submarine pipeline from the storage area would then carry the coal in slurry form approximately six miles out into the ocean where an offshore loading terminal in 60 feet of water could accommodate bulk carriers up to 120,000 dwt. If larger vessels are contemplated, 90 feet of water is available about 22 miles offshore. Tradeoffs in cost of additional pipeline versus economy of scale provided by larger ships would have to be evaluated.

It should be emphasized that, while no offshore coal terminals are in existence in the U.S. today, such a concept is receiving serious attention in the coal transportation community. In essence, the concept of an offshore coal terminal bypasses the existing bottlenecks at coal ports and results in new export ports without the need for conventional port infrastructure--new harbors, piers, ground transport, and expensive waterfront property. It can be implemented quickly, it may be more environmentally acceptable, it can accommodate larger ships and provide a lower ocean transport cost, and it can be readily expanded to meet growing demand. In the case of Site C-18, it offers the additional advantage of probable public acceptance in that both the coal storage area and the offshore loading facility could be designed and located so they would not be visible from or impact on inhabited areas.

Site C-17: North End of Existing SPA Terminal--Although a description of Site C-17 in terms of a prospective OCS support base site was provided in Chapter 2, some additional remarks relative to its potential as a coal terminal are in order. As indicated in Figures 18 and 19, a two-phase project is envisioned that would utilize a portion of the north end of the SPA terminal (Figure 20) to construct a coal export terminal.

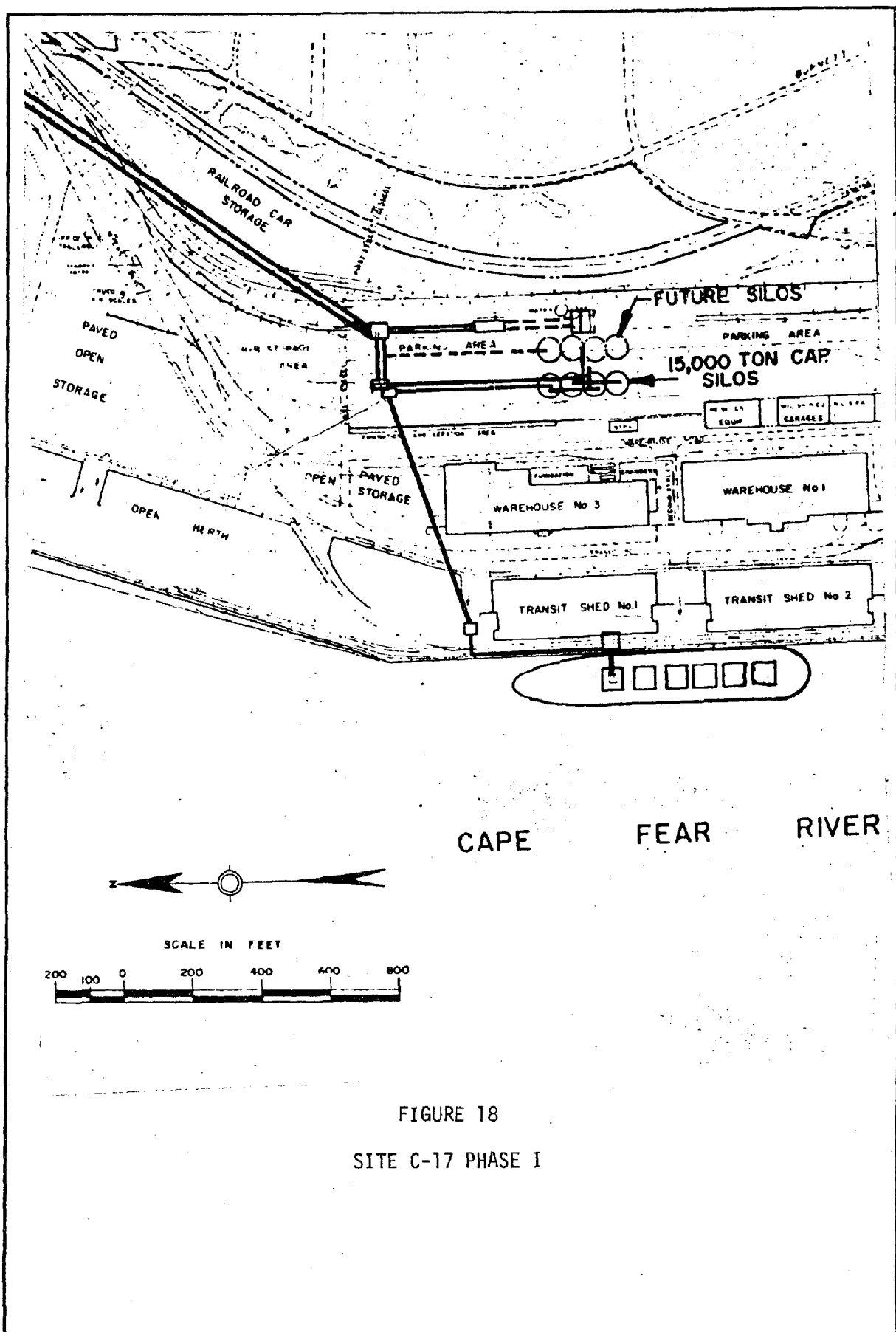
Phase I (Figure 18) would include the development of a 6-acre tract east of Warehouse No. 3 to construct several 15,000 ton silos for storing coal. Coal would arrive by unit train on the SCL tracks, be stored in the silos, and then transferred by conveyor belt to Berth B for vessel loading. Annual throughput capacity of Phase I is expected to be about three million tons.

Phase II would encompass plans for a 52-acre undeveloped area shown in Figure 19. Coal would arrive in the existing rail yard and be stored on the ground in 80,000 ton stockpiles. Initially, this coal would move south by conveyor belt to Berth B for shiploading. After a new loading pier, which could accommodate 65,000 dwt vessels, is constructed alongside the Phase II storage area (Berth C), the conveyor system would permit simultaneous loading of two ships.



FIGURE 17

HAMPSTEAD/SCOTTS HILL--SITE C-18



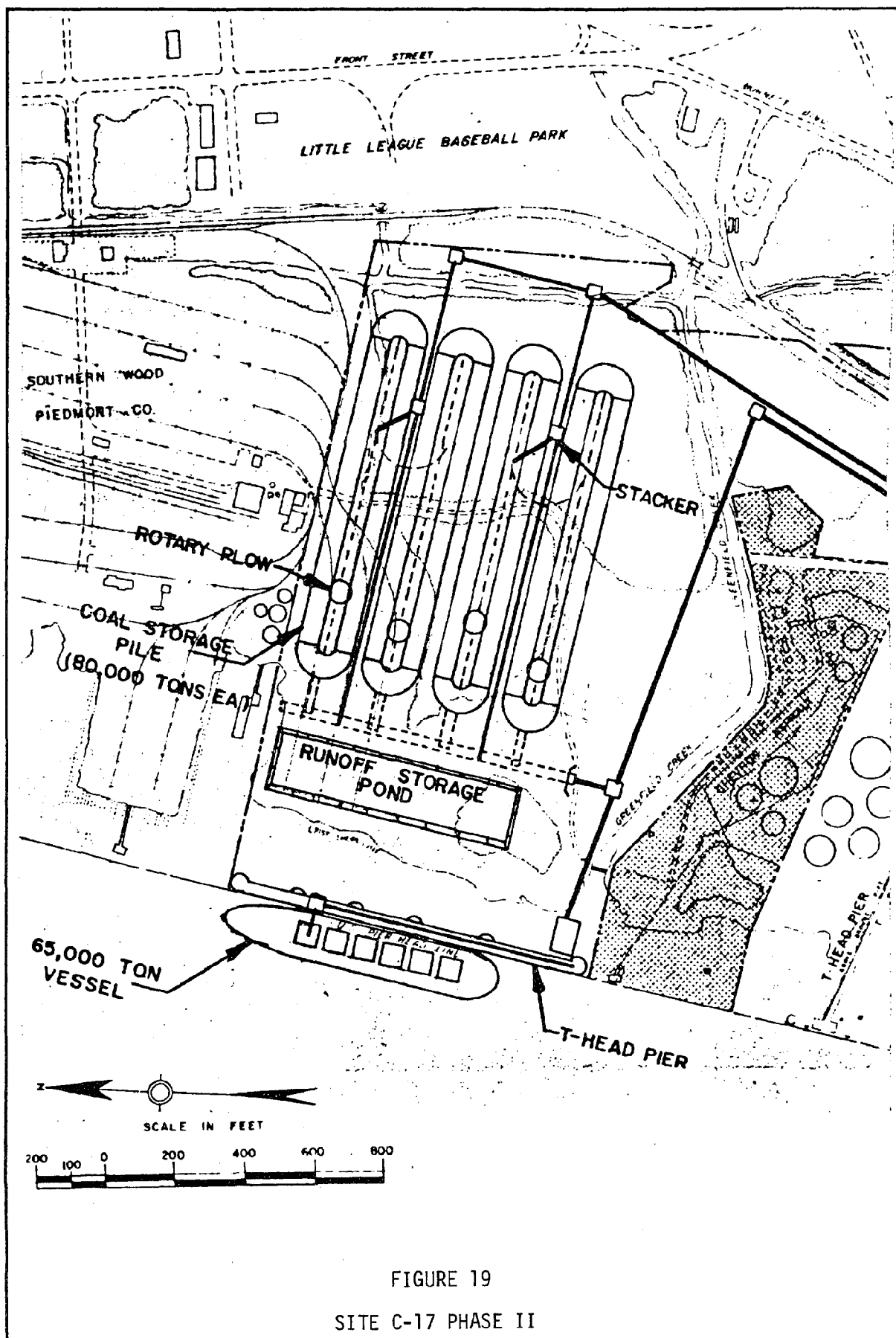


FIGURE 19

SITE C-17 PHASE II



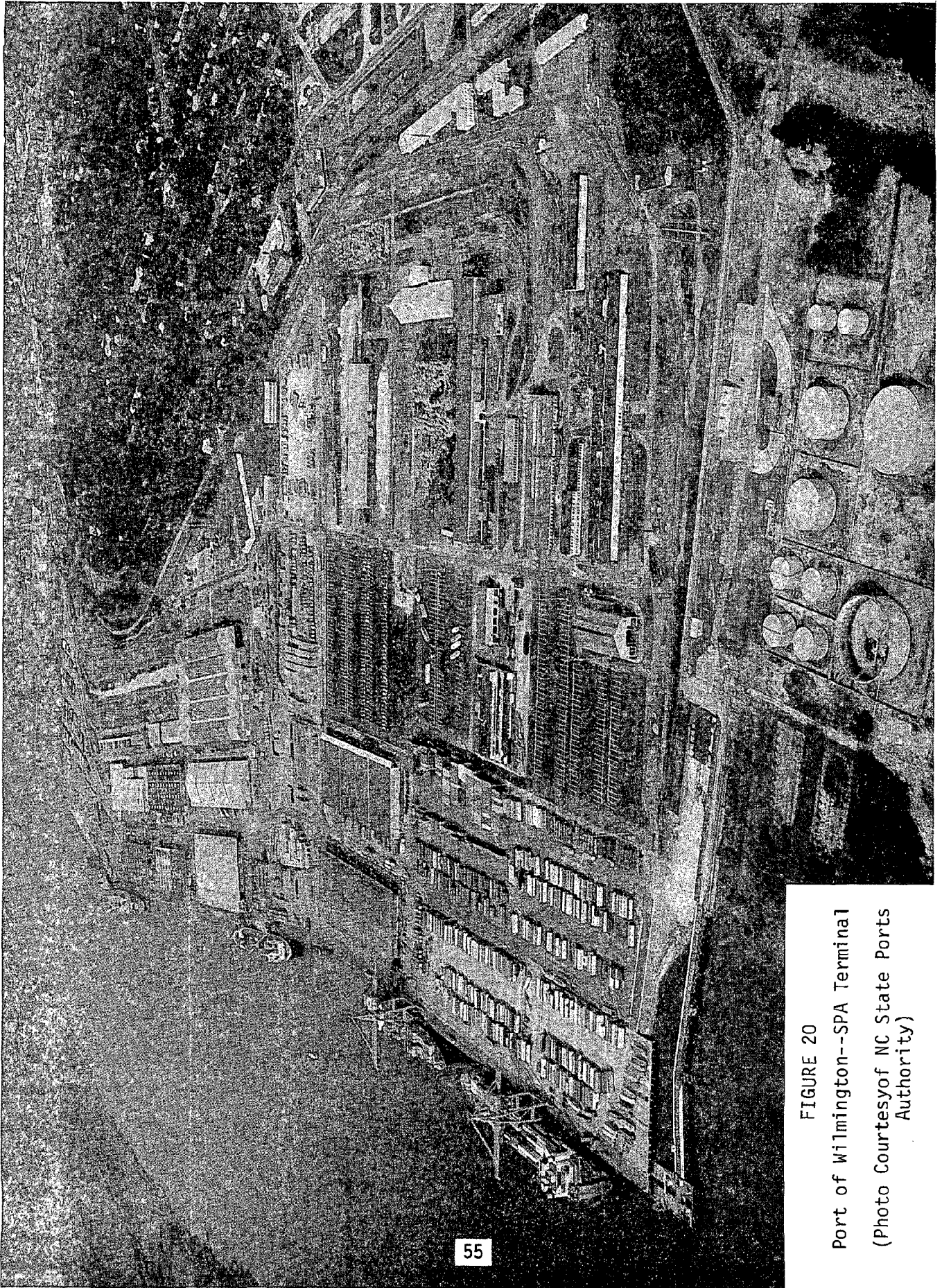


FIGURE 20  
Port of Wilmington--SPA Terminal  
(Photo Courtesy of NC State Ports  
Authority)

Total capacity of the entire project is estimated at nine to twelve million tons annually. Actual implementation of this project will depend upon negotiations with prospective coal shippers, since a firm contract does not presently exist. Many inherent advantages can be credit to this site as a potential coal export terminal--the SPA already owns the land, Berth B and the necessary rail facilities are in place, and of course, the SPA terminal is presently zoned and in use as an industrial entity. Offsetting these advantages is the need to move the unit coal trains through the city of Wilmington where numerous grade crossings are encountered.

### 3.5 Improvements Needed

Eleven prospective coal terminal sites were listed in Table 13 and described in Chapter 2 or in the preceding section of this chapter. After field inspection, each of the sites was evaluated to determine compliance with the infrastructure requirements listed in Table 12. As in the case of OCS support base sites, an updated parametric analysis for coal terminals was performed; and the results are summarized in Table 14.

Analysis of the coal sites is complicated by the fact that several of the sites, regardless of whether or not they are the best sites, have already been selected by coal companies as export terminal sites. As a result, Sites C-12 and C-16 in Morehead City and C-7 and C-20 in Wilmington have been pre-empted for coal terminals in the past six months. In fact, most of the better sites have either been purchased or are presently under option.

With these constraints in evidence and considering the findings revealed in this chapter, the following tentative recommendations are proposed:

#### Morehead City Sites

1. That because the planned throughput of the Alla-Ohio Valley (C-16) and Gulf Interstate (C-12) terminals, which may total up to 32 million tons annually by 1990, will far exceed the practical capacity of the railroad line through Morehead City, future expansion of these terminals should be very carefully evaluated.

2. That no additional coal terminals be approved in the Morehead City Harbor until major changes are implemented in the land transportation link for coal inbound to the port. These changes could include a rail bypass, slurry pipeline, conveyor system, barge service, or some combination of systems.

#### Cape Fear River Sites

3. That, other than a moderate-sized coal terminal on SPA property (C-17), no additional coal terminals should be sited on the east side of the Cape Fear River because of railroad grade crossing problems in Wilmington.



TABLE 14. ANALYSIS OF COAL TERMINAL SITES

	Morehead City					Southport		Wilmington				
	C-12	C-13	C-14	C-16	C-19	C-5	C-7	C-8	C-17	C-18	C-20	
	Gulf Interstate	Marsh Island	US 70 and NC 24	Alla-Ohio	Brant Island	North of Pfizer	Utah Int.	Town Creek	SPA Terminal	Hampstead	American Coal	
Acreage	2	2	1	3	2	1	1	1	2	1	2	
Land Use	1	1	1	1	2	2	1	2	1	1	1	
Rail Access	3	3	1	3	3	2	2	2	1	1	1	
Access to Open Water	1	2	3	1	1	1	2	2	2	2	3	
Proximity to Channel	1	3	3	1	1	3	3	3	1	3	1	
Channel Depth	1	3	3	1	1	1	3	1	1	3	3	
Highway Access	2	3	1	1	3	2	2	2	1	1	1	
Environmental Sensitivity	1	3	1	1	3	2	2	3	1	2	1	
Archeological or Historical Site	1	1	1	1	1	1	3	1	1	1	1	
Competing Energy Use	3	2	1	2	1	2	2	3	2	1	1	
Permittability	1	3	2	1	3	2	3	2	1	2	1	

Legend:

1 — Good

2 — Fair

3 — Poor

4. That, if additional throughput capacity is required along the Cape Fear River, Site C-5 (north of Pfizer Chemical Company) and Site C-8 (north of Town Creek) should be considered as the best of the remaining available sites.

#### Offshore Sites

5. That, if any coal companies desire to develop an offshore export terminal complex to load coal in deep water (>60 feet), Site C-18 (Hampstead/Scotts Hill) and possibly Site C-14 (near U.S. 70 and N.C. 24 west of Morehead City) should be initially considered.

### 3.6 Summary

Utilizing U.S. coal production and export projections from a series of recent national studies, estimates of East Coast coal terminal capacity were prepared. Export potential for the South Atlantic range of ports, with particular emphasis on North Carolina's two deepwater ports, was then explored.

Firm commitments or announced plans to locate coal terminals in the State have been reported in the news media for five locations. If all of these plans materialize and if the announced tonnages are realistic, as much as 54 to 67 million tons of coal could be exported from North Carolina by the end of the decade.

Finally, eleven prospective sites in the Coastal Study Area were described and analyzed to ascertain their suitability as future locations for coal export terminals. Specific recommendations for sites in Morehead City, along the Cape Fear River, and offshore were itemized. It is anticipated that, during Phase III of this study, alternative transportation modes or systems that could relieve anticipated bottlenecks in the coal-haul railroad network or other transportation networks will be investigated.

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Ports

North Carolina State Ports

OCS Impacts and Oil and Gas Studies

Coal

North Carolina Energy Statistics

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NOTE: Please note renumbering of reports 5-10.

